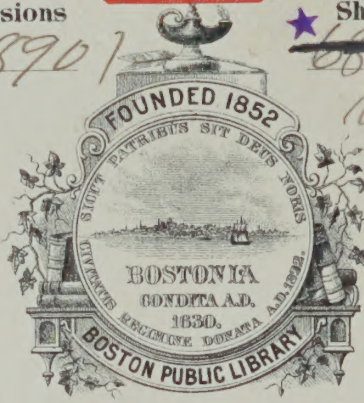






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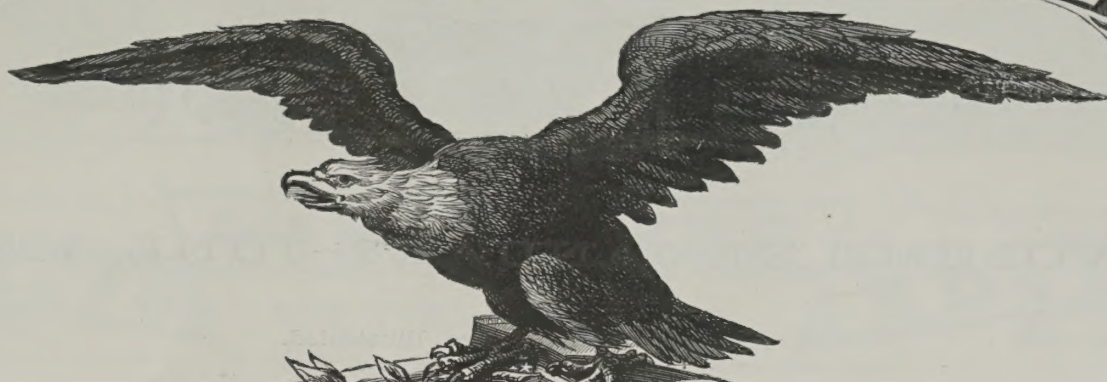
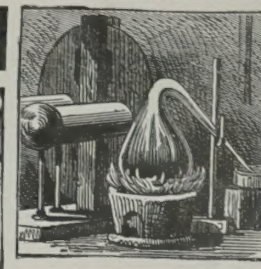
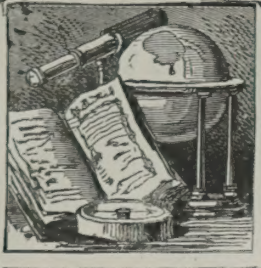












# SCIENTIFIC AMERICAN

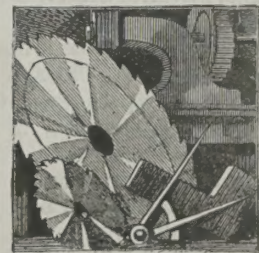
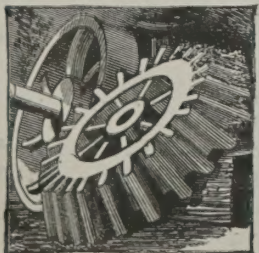


## ARCHITECTS AND BUILDERS EDITION.

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1891.

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Articles Marked \* are Illustrated.

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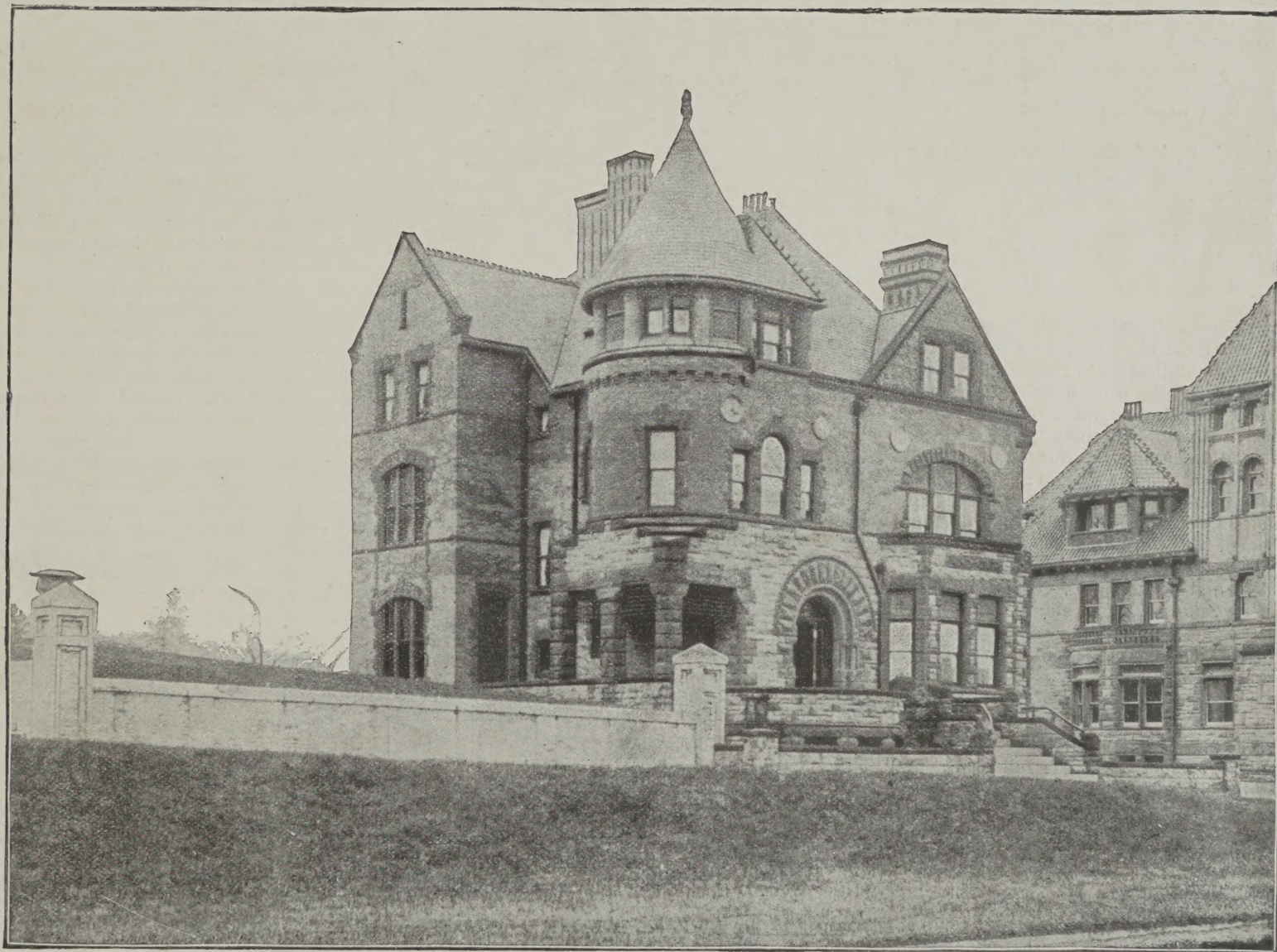
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A RESIDENCE ON RIVERSIDE PARK, NEW YORK CITY.—[See page 2.]





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THE

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## RESIDENCE ON RIVERSIDE PARK, NEW YORK CITY.

One of our colored plates in this issue presents floor plans and perspective of an elegant residence, erected for W. A. Pullman, Esq., on Riverside Avenue, New York. A second perspective view of the house is shown in our plate on first page. Dimensions: Front 47', side 57', exclusive of front porch. Height of ceilings: Cellar 9', first story 11', second 9' 6", third 9'. The underpinning, front and south side of first story, are built of Jersey graystone, trimmed with Long Meadow sandstone. The rest of the exterior walls are built of Tiffany (old gold) brick. Roof covered with red English tiles with cresting, etc. First floor is trimmed with natural cherry. Hall has a paneled wainscoting, open fireplace and a grand staircase, with carved newels, etc. Vestibule has similar wainscoting and a tiled floor. Parlor, dining room, and library have large, open fireplaces with tiled hearths, facings of Mexican onyx, and mantels of cherry, elegantly carved and furnished with beveled plate mirrors, etc. Dining room contains a buffet built in of exquisite design. Back of dining room is the toilet, paved and wainscoted with white English tiling, butler's closet, with bowl, dresser, closet, and dumb waiter to kitchen, and servants' hall and staircase which leads from basement to third floor. Second floor is trimmed with natural sycamore, and contains four bedrooms, provided with large closets, two bathrooms, and other apartments. Bathrooms are paved with unglazed tiles and wainscoted with white English tiling, and are furnished with tub, bowl, and closet in the best possible manner, all plumbing being exposed. Fireplaces on this floor are fitted up similar to those already described. Third floor, trimmed with sycamore, contains six bedrooms and bathroom. Cellar or basement contains billiard room, trimmed and wainscoted with antique oak, kitchen, laundry, man's bedroom, bathroom, furnace, and storeroom. Steam heat is provided also, electric bells, speaking tubes, and all modern conveniences. Cost \$60,000 complete. Architect Mr. Frank Freeman, New York. Our plates were made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

## A COTTAGE AT MAPLEWOOD, CHICAGO.

One of our colored plates this month shows the perspective and two floor plans of the above residence, which is an attractive and convenient dwelling of moderate cost. The house is of frame construction, covered with clapboards and shingled roof. The porch is on the right hand side of the front, and on the left is a veranda 2 feet 11 inches above the grade line. The parlor opens off the hall to the left, and measures 16 feet by 16 feet 6 inches; it connects to the parlor by *portieres*. The library, situated at the rear of the parlor, is 15 feet by 17 feet, has separate entrance from the rear hall, an open fireplace, and is lighted by mullioned window. The dining room, situated abreast of the library, is entered from the main hall direct or from rear hall. It measures 15 feet by 16 feet, has handsome angle fireplace and large bay window. The pantry is situated at the rear of this room, and at the back of this is the rear porch, both of which open off the kitchen. The kitchen measures 12 feet by 21 feet 6 inches, is fitted with all modern conveniences and contains back stairs. There are four chambers on second floor, with toilet room containing bath, water closet, etc. This house is estimated to have cost about \$3,000.

Our plate was prepared direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

## COTTAGE AT RUTHERFORD.

Our illustration, page 4, presents a cottage, colonial in treatment and feeling, erected for Mrs. E. W. Price, at Rutherford, New Jersey. Dimensions: Front, 36 ft. 6 in.; side, 45 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft. The underpinning and first story are built of dark red sandstone "rock faced," and laid up at random; the rest of the building is of wood, covered with shingles and painted colonial yellow with ivory white trimmings. Roof shingled, and stained green. Hall trimmed with cherry, is finished effectively; it contains a pretty little nook, with a brick fireplace, an ornamental staircase, lighted by stained glass windows, and closet under. One of the pleasing features is the reception room on first landing, which is finished with mahogany. Parlor is finished in ivory white, with a little gilt; dining room with antique oak. Floors are of hard wood. Fireplaces are fitted with tiled hearths and hard wood mantels. Kitchen, laundry, rear hall, etc., are trimmed and wainscoted with North Carolina pine finished natural. There are five bedrooms and bathroom on second floor, and three bedrooms and storage room in attic. Bathroom is wainscoted and contains tub, bowl, and closet complete. These apartments are trimmed with whitewood—some stained in imitation of hard wood, and others painted in colors. Cost \$6,000 complete. Mr. Chappell Slade, New York City, architect.

Our engraving was made direct from a photograph

of the building taken especially for the SCIENTIFIC AMERICAN.

## A COTTAGE AT ENGLEWOOD, CHICAGO, ILL.

We present on page 8 two floor plans and a photographic view, taken especially for the SCIENTIFIC AMERICAN, of Mr. Salter's cottage No. 6557 Perry Ave., cor. 66th Street, Chicago. C. C. Haskins, architect. The basement story is of stone. First story frame, covered with clapboards and second story and roof shingled. The veranda extends from the main entrance half way along the south side. The main entrance opens on to the hall, from which there is the main staircase, made of oak, with handsome newel and balusters.

The parlor, 14 by 20 ft., has angle fireplace, bay window looking on to the front, and mullioned window at side. It communicates with the library by *portiere*, also with hall direct. The library, 14 by 14 ft., is well lighted by two mullioned windows and is entered from the parlor or rear hall. The dining room, 14 ft. by 14 ft. 6 in., is lighted by an alcove mullioned window, and is entered either from front or rear hall. The kitchen, 12 by 14 ft., is fitted with range, sink, tubs, etc. communicates direct with rear porch. There are four pleasant chambers on the second floor, with closet rooms, also toilet room, fitted with all conveniences. There is a very good attic accommodation. The house is picturesquely situated, and is estimated to have cost \$4,200.

## A RESIDENCE ON POWELTON AVENUE, PHILADELPHIA.

We present on page 9 plates of a residence, erected for M. Riebenack, Esq., on Powelton Avenue, Philadelphia, Pa., from plans prepared by Thomas P. Lonsdale, architect, of same city. Dimensions: Front 47 ft., side 73, exclusive of piazza. Height of ceilings: Cellar 8 ft., first story 11 ft., second 10 ft., third 9 ft. The exterior walls are built of Chester county marble, trimmed with buff Indiana limestone. The masonry is laid broken range, lock split and cement pointed in joints.

The roof is of Vermont red slate, with copper cornices, gutters, hip and ridge coverings. The reception and drawing rooms are trimmed with mahogany; hall, staircase, dining and breakfast rooms with quartered white oak; and rear hall, pantries and kitchen with ash. Hall and dining room have ceiling beams and paneled wainscoting, the former containing a grand staircase with carved newels, which is lighted by stained glass windows. Vestibule has a tiled floor. Other rooms have hardwood floors. Fire places have tiled hearths, Mexican onyx facings and elegant carved mantels with beveled plate mirrors. Kitchen is wainscoted and fitted up in the best manner with range, sink, dressers, etc. Second floor contains library, three bedrooms, and bathrooms, all trimmed with cherry, mahogany finish. Bathrooms have tiled floors and wainscoting, fixtures of the latest sanitary patterns, without casings, trimmed with nicked fittings. Third floor trimmed with quartered sycamore, natural color, contains billiard room, servants' bedrooms and bath, with a private staircase to first floor. Cellar, under whole of house, contains laundry, furnace room and all necessary apartments. Cost, \$30,000 complete.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE AT JACKSON PARK, CHICAGO.

We publish, on page 10, floor plans and a photographic view of the above cottage, which is situated at No. 5557 Munroe Avenue, corner of Fifty-sixth Street, Chicago. The location is a pleasant one, and the house sits comfortably on the lot. The veranda extends half way across the front, and is 4 ft. 1 in. above the grade line. The parlor is 14 ft. by 15 ft., with bay window extending across the whole front. It connects with the hall by a *portiere*; also with both dining room and library. The dining room is also 14 ft. by 15 ft., with handsome angle fireplace, and connects with the library and kitchen. The library is the same size as the parlor and dining room, and has a handsome fireplace and large oriel window. The kitchen is also 14 ft. by 15 ft., and is fitted with all modern conveniences, range, sink, etc., and has a rear porch in connection with it. The second story contains five handsome and commodious bed chambers, each with large closet, also a toilet room, with bath, water closet, etc. The cost is estimated to have been \$4,000.

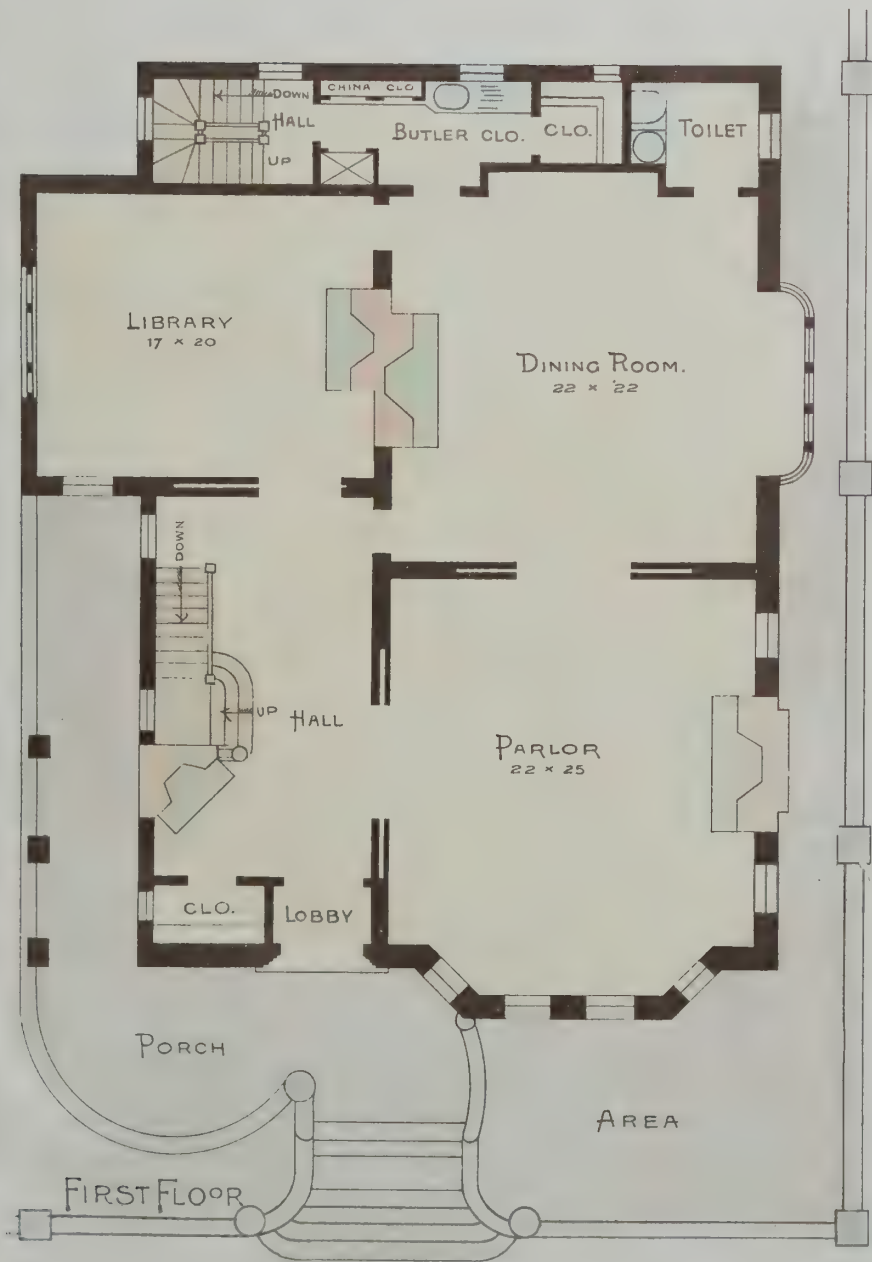
Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

**METAL CEILINGS.**—One of the most excellent of recent innovations is the introduction of metal ceilings in place of wood and plaster. These ceilings do not shrink or burn like wood. They will not stain, crack, or fall off like plaster, but being permanent, durable, fireproof, and ornamental, will eventually supersede both wood and plaster, besides being in the end far more economical than either.





A Residence on Riverside Park, New York.









## WHITWORTH HOSPITAL.

This hospital has been erected by the trustees of the late Sir Joseph Whitworth, Bart., of Stancliffe, on a piece of ground on the high road between Darley Dale and Matlock, England. In the main building provision is made for eight beds (four for men and four for women), medical officers', matron's, and nurses' rooms, parlor for convalescents, etc. In the detached building provision is made for two men patients and two women patients, nurses' room, and patients' sitting room. A mortuary is built at the back of the detached building, screened from all the windows of the buildings. The materials used are local stone of rich varied tints for the lower portions, with red tile hangings for the upper stories, and red tiles for the roof. The buildings are fitted up with all modern conveniences, and great attention has been paid to the sanitary arrangements. Architects, J. W. and R. F. Beaumont, of Manchester. Our illustration is from the *Building News*. The design contains several pleasing features which might be adapted to a private residence.

## The Marble Industry.

A member of a prominent marble works of Cincinnati, in an interview with a reporter of the *Times-Star*,

ness up to almost any thickness desired. For general purposes we try to get out ten slabs to the foot. For furniture purposes they use slabs seven-eighths of an inch thick.

"From the saws the slab goes to the cutter, who cuts them into the sizes wanted. He's just going to cut one now. Watch how nicely he does it." The cutter put his slab on an Italian marble table on which he had previously sprinkled sand in order to be able to make it move more easily. He marked out a line with a chisel, and then turned the slab over, and putting a small piece of wood under it, ran a broad tool over a line corresponding to the one he had marked out with the chisel, hitting it sharp taps as he went, and the marble was cut as clean as if done with a diamond.

From the cutter it goes to the man who smooths it off. This is done on a swiftly revolving bed of cast iron, on which sand is sprinkled and water allowed to flow. "This slab," said the reporter's guide, "was  $4\frac{1}{2}$  inches thick five years ago. Now it is hardly an inch thick. It wears away, I tell you." The edges of the slab are first smoothed, and then the flat surface is smoothed down, weights of stone being placed on the slab during this portion of the process. When it is quite plumb the bevel edge, if there is to be one, is put on.

white that it has, the higher priced it is. For simply mottled, almost entirely red or brown marble, only about \$1 a cubic foot can be obtained, while for richly marked the price will run up to \$3.50 a cubic foot. If we cut it with the grain, we get only mottled surfaces as a general thing, while across the grain there is always a better marking, and as a result a higher price."

## Lighting Streets of London.

In 1661 the streets were directed to be lighted with candles or lanterns by every householder or occupier fronting the main road from nightfall to 9 P. M., the hour of retiring to bed. In the last year of King Charles II.'s reign, one Edward Heming obtained the right of lighting the streets with lanterns placed over every tenth door, from six on moonless evenings until midnight, between Michaelmas and Lady Day. During the reign of Queen Anne, in July, 1708, Mr. Michael Coke introduced globular glass lamps with oil burners, instead of the former glimmering lanterns. In 1716 an act was passed which enjoined every householder to furnish a light before his door from six to eleven o'clock at night, except on evenings between the seventh night of each new moon and the third after it reached the full. In a few years a company was formed to light



WHITWORTH MEMORIAL HOSPITAL.

gives the following graphic description of the process of marble manufacture:

"There is the Tennessee, running from brown to red; the Georgia about the same; the Italian—that's white; the Belgian, black; the Egyptian, black and gold, and I don't know how many others. We handle mostly Tennessee marble, and get it from the very wildest part of the mountains down there. The big 'bowlders,' as the people in the neighborhood call them, can be seen sticking out on the sides of the hills, or the marble is seen in ledges on the bare bluffs. The negroes do nearly all the work down there. They strip the loam from about the marble, drill holes, split it with wedges, and then use a steam cutter, so as to get it out in better shape. You should see those negroes working away in the boiling hot sun, one holding the drill and turning it around, and one on each side of him alternately hitting the drill with a big sledge.

"After it is gotten out of its bed it is loaded on the car—a big block, you know—and shot up here. We do the cutting with long steel bands fixed in a swinging frame or 'gang.' Sand and water are used with the steel, and between the three the marble is ground, you might say, into slabs. The steel bands are about four inches wide when they are first put in, but in about three cuttings they are down to an inch, and then we can't use them any more. We used to have a man standing at every 'gang' to throw sand over the block, but now use a machine that does that. Another improvement of late is the use of crushed steel for our saws. It wears much better than the ordinary steel. The marble is cut in slabs of from half an inch in thick-

The slab now goes to the polishing room. Here it is rubbed still smoother by hand, a soft stone called "Scotch hone" being employed together with soft sandstone. Any defects in the slab are here filled with wax. A broad piece of steel is heated red hot and laid upon the marble. The wax is then melted into the hole to be filled and a small piece of marble placed on it. A sharp blow with the hot steel powders it, and it is then rubbed into the hole with the wax; the superfluous wax is then rubbed off with sandstone. For the final polish a machine is used. For flat surfaces a long buffer of felt is used, together with a mixture called "green putty" and water. The buffer is so adjusted as to move backward and forward, and so the polish is put on. The composition of this green putty is not known, there being only one place where it is made and that is at California, up the river here. For rounded surfaces a round buffer is used. From the buffer a boy takes the slab and washes it off, when it is ready for the market.

Holes for the screws are put in with drills of tempered steel—this being the only process in which marble is handled with metal alone. In all others sand and water enter into the process of cutting the stone.

"Marble is being used more and more for interior decorative purposes," said the guide in conclusion. "Not only in plumbers' work, but in wainscoting as well. The different colors of marble are combined for this, and very pretty effects can be gotten. Why, only last week a Chicago builder ordered sixty car loads of it, and it was to be used for interior decoration. In this Tennessee marble the more pattern markings in

the street from six o'clock until midnight, each householder who paid poor rates being required to contribute for this purpose six shillings a year. Gas at its introduction, in the beginning of the present century (now paled by Bude and electric lights), presented such a novel spectacle to the eyes of the foreign ambassadors, that they were vain enough to imagine that the brilliant lamps were only a part of a general illumination to celebrate their arrival.—*M. E. Walcott.*

To make a waterproof writing-ink, that will not blur if the writing is exposed to rain, dissolve two ounces shellac in one pint alcohol—95 per cent.; filter through chalk, and mix with best lamp black.

## PATENTS.

Messrs. Munn & Co., in connection with the publication of the *Scientific American*, continue to examine improvements and to act as Solicitors of Patents for Inventors.

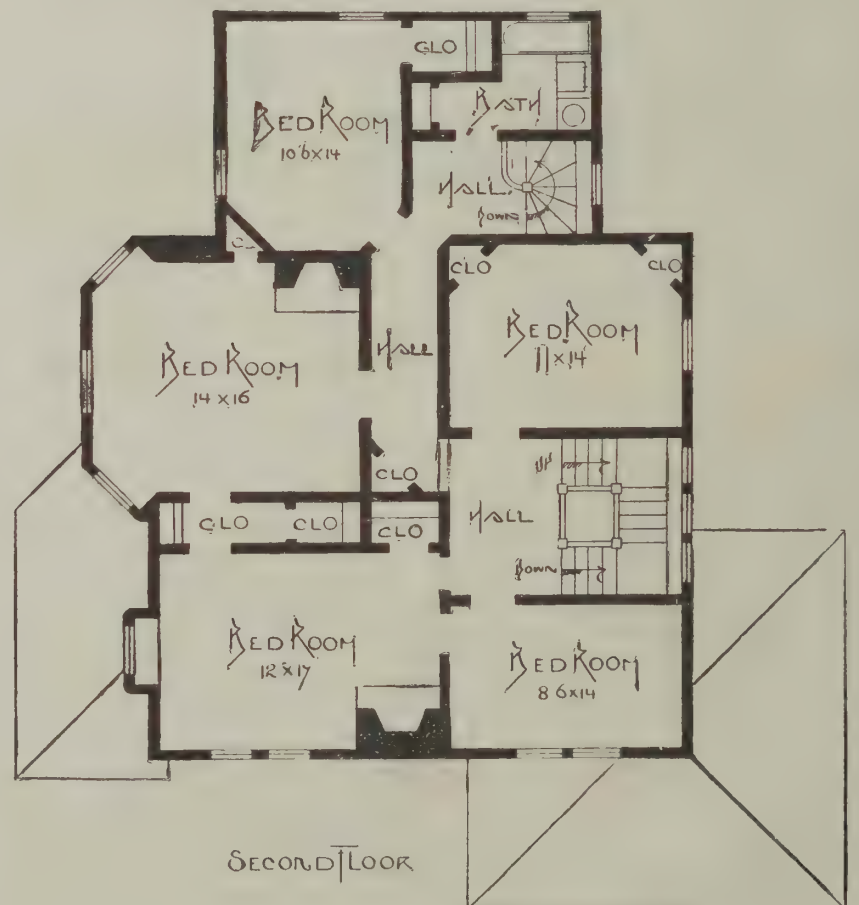
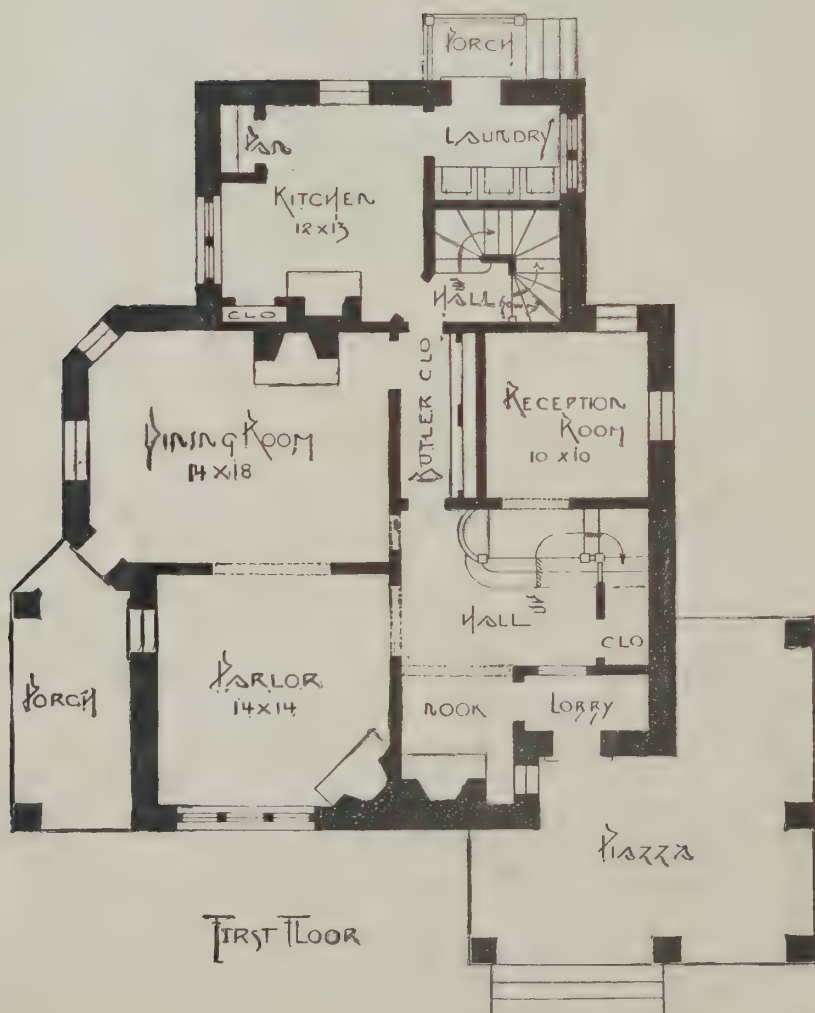
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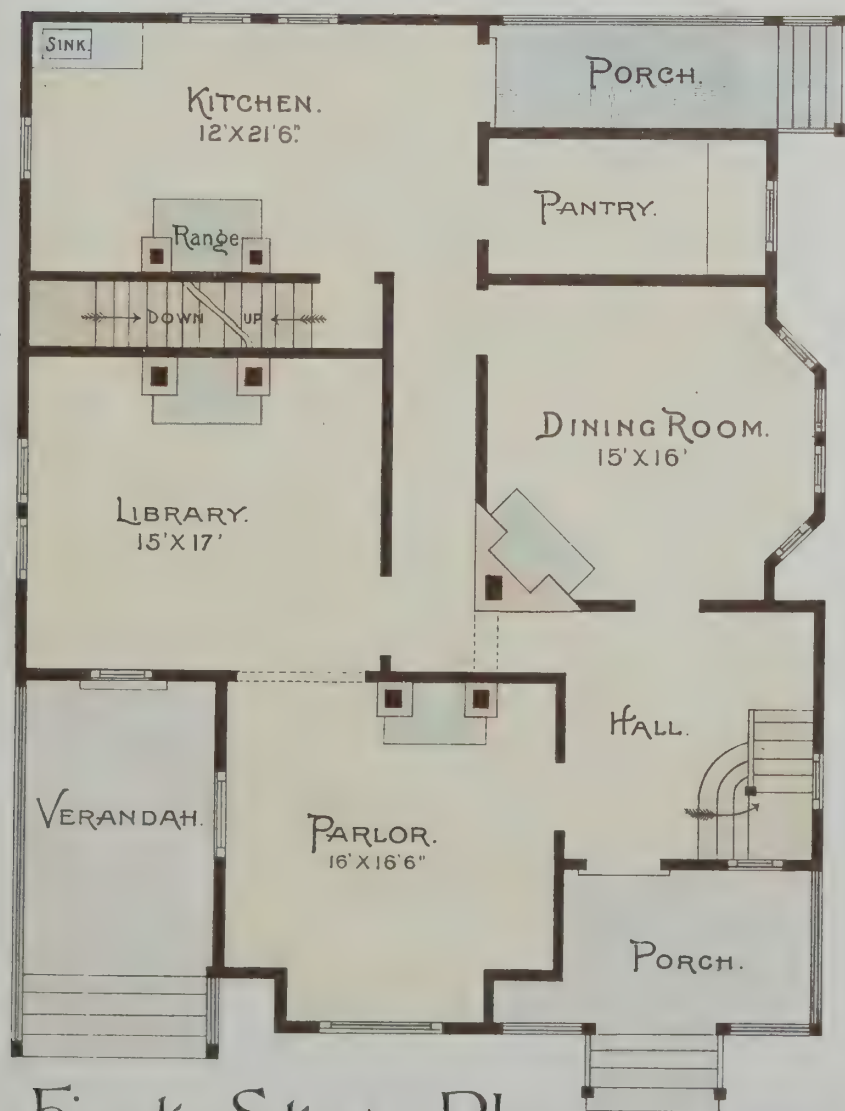


A COTTAGE AT RUTHERFORD.—[See page 2.]

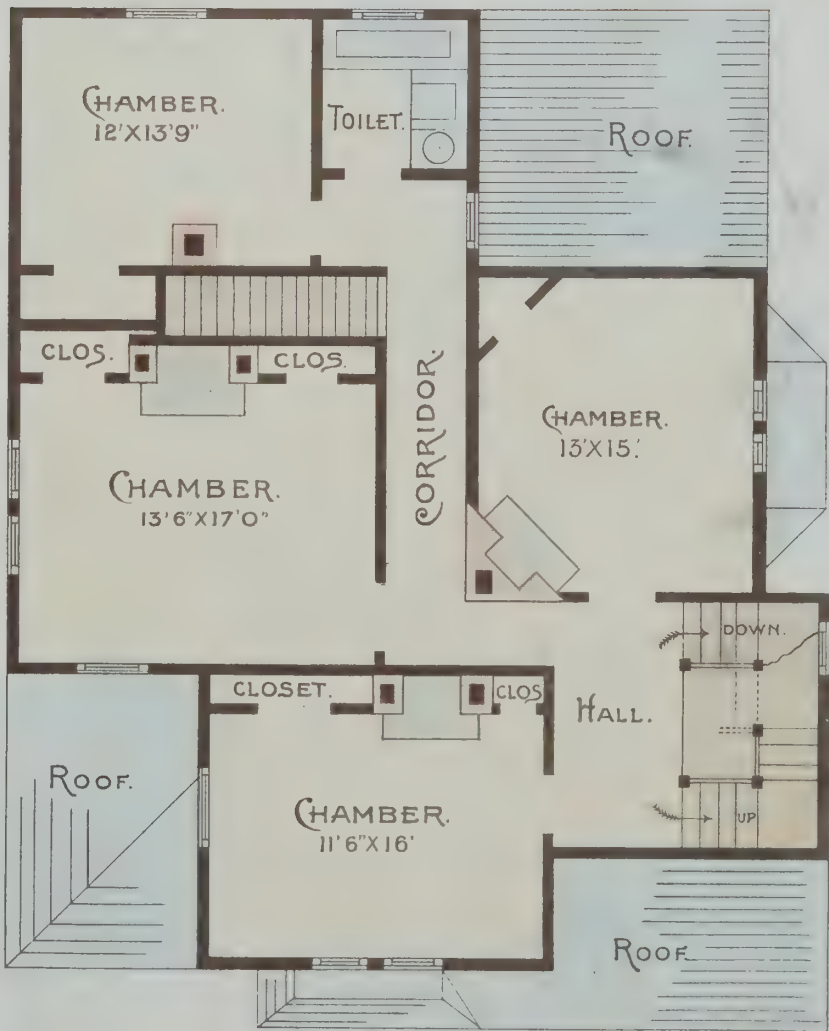




A Cottage at Maplewood, Chicago.



First Story Plan.



Second Story Plan.









A RESIDENCE AT CHESTNUT HILL, PA.—[See page 6.]



## A RESIDENCE AT CHESTNUT HILL, PA.

We illustrate on page 5 a residence ("Blithedell") recently erected for Mr. Alfred C. Rex, at Chestnut Hill, Pa., from plans prepared by Lindley Johnson, architect, Philadelphia, Pa. Dimensions: Front, 72 ft. 6 inches; side, 56 ft., exclusive of piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The principal features are the large piazzas, balconies, lookout in tower, and the well arranged plans. The exterior walls are built of rock-faced Chestnut Hill stone, laid at random, except walls to bed room over dining room, which are covered with stucco work. Roof shingled and stained moss green. Hall spacious, trimmed with antique oak, has ribbed ceiling beams and a paneled wainscoting; it contains an open fireplace built of Kentucky limestone, carved, a nook with seats, and a grand staircase—the two latter separated from the hall proper by arches, Moorish in treatment, supported on hard wood columns with carved capitals. Staircase has stained glass windows, which shed a soft and pleasant light over upper and lower halls. Parlor and dining room are trimmed with mahogany, and library with oak, each having fireplaces with tiled hearths, Mexican onyx facings and

by 12 ft., warmed by an angle fireplace and lighted by front and side windows. The kitchen also serves as dining room, and measures 12 ft. by 16 ft. 6 in., is fitted with range, sink, etc., and opens on to rear porch. There is a bed chamber on this floor, situated at the rear of the parlor, and measuring 10 ft. by 10 ft. Upstairs there are two chambers of convenient size, with closets attached. The front chamber opens on to a pleasant covered balcony, which is built over the veranda. The cottage is surrounded by nice lawns, and is estimated to have cost \$900.

Our illustration was made direct from a photograph of the house specially taken for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT WAYNE, PA.

Our illustration, page 12, presents a residence erected for Mr. H. Whitney, at Wayne, Pa., from plans prepared by W. L. Price, architect, Philadelphia. Dimensions: Front, 57 ft.; side, 42 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. 6 in. The special features are the well shaded piazza, bay windows with seats, tasteful effects in stained glass rundells, etc. Underpinning, columns,

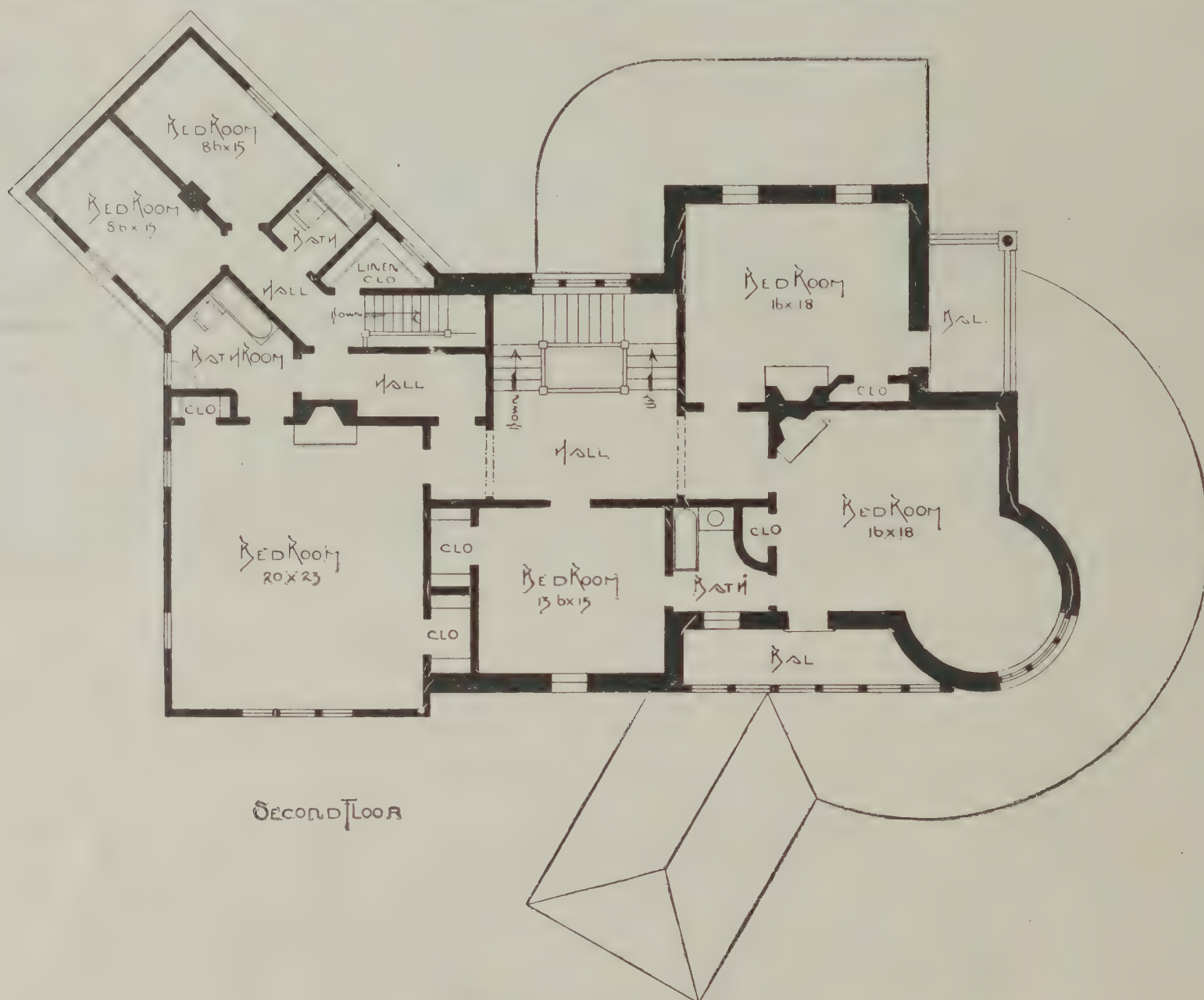
capacity of about 250. The organ is screened by heavy tapestries. Sliding doors separate the class room, which is 21 × 39 ft., and has a seating capacity of about 75, is well supplied with bookcases. It is built of rock-faced, coursed rubble stone, with red mortar. The whole is artistically grouped. Shingles stained a dark brown. All glazing is of cathedral glass, diamond shaped. The ceiling is exposed timber work. A large furnace in the cellar furnishes the heat. It is a credit to the architect, Wilbur S. Knowles. Estimated cost about \$15,000. Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

## A COTTAGE AT LAKEVIEW, CHICAGO.

On page 14 we give floor plans and photographic view of the above cottage, situated near the new Sheridan drive.

The house is cellared throughout, the basement being built of light stone 18" thick. The rest of the house is of frame construction, first story covered with clapboards and second story and roof shingled.

The front porch, 3' 6" from the grade line, forms a small veranda.



## A RESIDENCE AT CHESTNUT HILL.

mantels elegantly carved, etc. Floors throughout of hard wood, polished. Kitchen, laundry, and its various apartments are trimmed with ash, and are replete in all their appointments. Second floor contains four bed rooms, bath rooms, besides two servants' rooms, bath and private stairway to kitchen, thus shutting off communication from other apartments. These rooms are trimmed with ash, oak, and mahogany respectively. Bath rooms are paved with unglazed tiles and wainscoted with white English tiling; they are fitted up in the best possible manner, with white enameled tub, etc. Third floor contains three bed rooms, bath and billiard room. Cost \$30,000 complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

## A COTTAGE ON MUNROE AVENUE, CHICAGO.

We publish, on page 11, two floor plans and photographic view of the cottage No. 5730 Munroe Avenue, near Jackson Park. The basement story is built of brick and the rest is of frame construction covered with clapboards. A veranda extends across the whole front, 2 ft. 11 in. from the grade line. The parlor opens off the entrance hall, measures 12 ft. by 14 ft. 6 in., is well lighted from front and side windows, and heated from an open fireplace on the angle. A sitting room opens off the opposite side of the hall, measuring 12 ft

and balustrade to piazza are built up with rock-faced field stone, laid at random. The superstructure above, of wood, is covered with shingles, and painted colonial yellow, with ivory white trimmings. Roof shingled, painted red. The interior throughout is trimmed with whitewood; first floor stained and finished in oak, and second floor finished natural. Hall contains a very handsome carved staircase of oak, which is lighted by stained glass windows with pleasing effect. The fireplaces have tiled hearths and facings, and hardwood mantels of exquisite design. Kitchen, laundry and pantries are wainscoted and fitted up complete. Second floor contains six bed rooms and bath, the latter wainscoted with narrow beaded oak, and provided with all the necessary furnishings. There are two bed rooms and store room on third floor. Cemented cellar contains furnace and other apartments. Cost, \$7,000, complete.

Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

## CHURCH AT GLEN RIDGE, N. J.

We give on page 13 a plate showing a perspective, also floor plan of an attractive country church of moderate size, recently erected at Glen Ridge, N. J., near New York. It is constructed of stone and shingles; the body of the church is 38 × 63 ft., and has a seating ca-

The parlor opens off the main hall and connects by sliding doors with the dining room. It measures 12' × 14', and is well lighted from front and side windows, and is heated by open angle fireplace.

The dining room is situated at the rear of the parlor and has separate entrance from the hall. It measures 12' × 12'. The pantry and kitchen both open off this room.

The kitchen is 11' 6" × 12', and is fitted with range, etc., and communicates direct with rear porch.

On the second floor there are three chambers and a dressing room. Toilet room, containing bath, water closet, etc. There is also good attic accommodation.

This house is estimated to have cost \$3,000.

Our engraving was prepared direct from a photograph of the house specially taken for the SCIENTIFIC AMERICAN.

## Mahogany Ties and Marble Bridges.

A traveler from Mexico reports that he was much struck with the magnificent construction of the Mexican Gulf Railway. The sleepers are of sound mahogany, and many of the bridges and culverts are, he says, built of white marble. Though this might appear, at first sight, to be lavish extravagance, the contractors have found the employment of these substances to be economical, as both mahogany and marble exist in abundance in the country traversed by the line.



## A RESIDENCE AT STOCKTON, CAL.

We give a sketch and floor plans of a residence at Stockton, Cal., for which we are indebted to the *California Architect and Building News*. C. R. & J. M. Wilson, architects, San Francisco. It is a compact, comfortable, and well-arranged dwelling. The dimensions of the several rooms are given on the floor plans. It will be seen they are liberal and well proportioned. The estimated cost of this house, finished in first class style, is \$10,000. But it might be built for less money by reducing the nicety of finish, also by lessening the various dimensions.

## Staining Floors.

For the benefit of those who desire to stain their own floors, the New York *Tribune* thus goes into details: In the first place, as to brushes, you can purchase at any paint shop what is necessary. Do not get them too heavy, as they will tire you; a medium round brush, a flat brush about six inches wide, a small "liner" to mark the edges and go into corners, and you have enough. After you have bought them soak them in water for half a day to swell the wood and prevent the falling out of the bristles, and they are then ready for use. Lard cans are most useful for mixing your stains, but if you buy that article in a more economical fashion tin vegetable cans will do if the top is cut entirely out.

To begin with the hall, I should recommend, if you are undecided about the color, raw sienna, rather than a darker stain, as it does not show dust or foot marks, and it harmonizes with any rug. The half of a pound can of prepared paint mixed with a gill of turpentine will give you all the color you require for quite a large room.

Now take your small brush and paint a line around the edge of your floor to prevent your large brush from smirching the walls. Then with the round paint brush paint the lengths of board with the grain of the wood. When stopping your work always complete the board on which you are working; thus the stain will look equal and even. Take a low chair by all means, as you can then paint your lengths of board with very little fatigue, merely moving the chair when desired. This is certainly not professional, but it has been tested and found most satisfactory.

The flat brush is for the hard oil finish, which you can apply as soon as the stain is dry to the touch. Then leave it for twenty-four hours at least, before placing any furniture upon it. Wax is recommended as the neatest, cleanest and most attractive way to keep a floor after it has been varnished.

Now for the floors of the drawing and dining rooms. For the first, if you do not mind a little trouble, try a border; it has a very pretty effect and is not much work. With a piece of chalk draw a straight line about a foot and a half from the wall; then with the small brush paint over it a broad flat line and another line of equal width against the wall. Now draw a geometrical figure—any figure will do—on brown paper nearly as large as the width of your border. Cut it out, and with your chalk draw lines around it at equal distances from each other and connect your figures with lines curved or straight as you like—the geometrical figures to be filled in solidly with stain. This border may be put on after the entire floor has

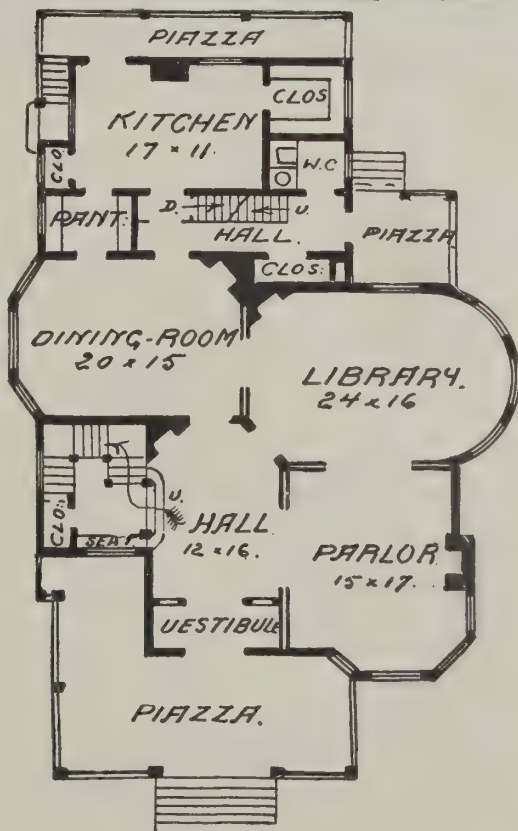
been stained. Of course the border may be made as elaborate as one wishes. One floor which was done in this way was very successful. The parquet itself was stained with raw sienna, and the figure on the border done in Prussian blue. If you like browns, try raw umber for your dining room. It will be sure to please you, but it must be well diluted—one gill of turpentine to a third of a pound can of the umber. If you wish it darker, add more of the color.

## The Peruvian Temple of Pachacamac.

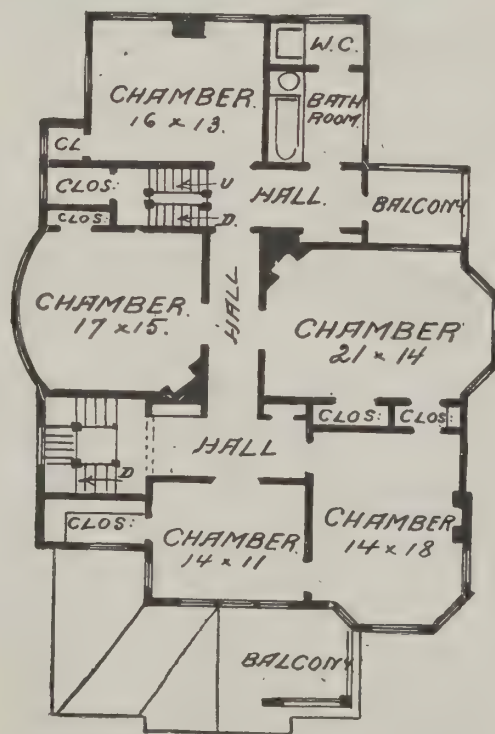
The Temple of Pachacamac, or Castle, as it is called by the Indians, is on the summit of a hill, with three terraces; the view of it from the north is somewhat like that of the pyramid of Cholula, given by Hum-

the northern terraces were also remains of apartments. Here the brick appeared more friable, owing to a greater proportion of sand. Where they retained their shape, their dimensions were 9 inches in width by 6 inches deep, varying in height from 9 inches to 2 feet, and they were laid so as to break joint, though not always in a workmanlike manner. The remains of the town occupy some undulating ground of less elevation, a quarter of a mile to the northward. This also forms a rectangle, one-fifth by one-third of a mile in size. Through the middle runs lengthwise a straight street, 20 feet in width. The walls of some of the ruins are 30 feet high, and cross each other at right angles. The buildings were apparently connected together, except where the streets intervened. The large areas were again divided by thinner partitions, and one of them was observed to contain four rectangular pits, the plastering of which appeared quite fresh.

No traces of doors or windows toward the streets could be discovered, nor indeed anywhere else. The walls were exclusively of sun-dried brick, and their direction, northeast and southwest, the same as those of the temple, which fronted the sea. Some graves were observed to the southward of the temple, but the principal burying ground was between the temple and the town. Some of the graves were rectangular pits, lined with a dry wall of stone, and covered with layers of reeds and canes, on which the earth was filled in to the depth of a foot or more, so as to be even with the surface. The skulls brought from this place were of various characters; the majority of them presented the vertical elevation, or raised occiput, the usual characteristic of the ancient Peruvians, while others had the forehead and top of the head depressed. Eight of these were obtained, and are now deposited at Washington. The bodies were found enveloped in cloth of various qualities, and a variety in its colors still existed. Various utensils and other articles were found, which seemed to denote the occupation of the individual: Wooden needles and weaving utensils, netting made in the usual style, a sling, cordage of different kinds, a sort of coarse basket, fragments of pottery and plated stirrups. They also found various vegetable substances: Husks of Indian corn with ears of two varieties, one with the grain slightly pointed, the other the short and black variety, which is still very commonly cultivated; cotton seeds, small bunches of wool, gourd shells, with a square hole cut out, precisely as is done at present. These furnished evidence of the style of the articles



FIRST STORY PLAN.



SECOND STORY PLAN.

## A RESIDENCE AT STOCKTON, CAL.

boldt, except that the flanks were perpendicular. The whole height of the hill is 250 feet, that of the mason-work 80 feet; the former is rectangular, the base being 500 feet by 400 feet. At the southeastern extremity the three distinct terraces are not so perceptible, and the declivity is more gentle. The walls, where great strength was required to support the earth, were built of unhewn square blocks of rock; these were cased with sun-dried bricks (adobes), which were covered with a coating of clay or plaster, and stained or painted of a reddish color. A range of square brick pilasters projected from the uppermost wall, facing the sea, evidently belonging originally to the interior of a large apartment. These pilasters give it the aspect of an Egyptian structure. In no other Peruvian antiquities have pilasters been seen by us. On one of

manufactured before the arrival of the Spaniards, and of the cultivation of the vegetable products. When to these we add the native tuberous roots (among them the potato) cultivated in the mountains, and the animals found domesticated, viz., the llama, dog and guinea pig, and the knowledge of at least one metal, we may judge what has since been acquired.—C. Wilkes.

THE DUNHAM MANUFACTURING COMPANY, of Chicago, engaged in the manufacture and sale of patent devices for railway construction and equipment, has established a widely extended business in several important specialties, which they have brought prominently before the leading railroads of the United States and Canada.





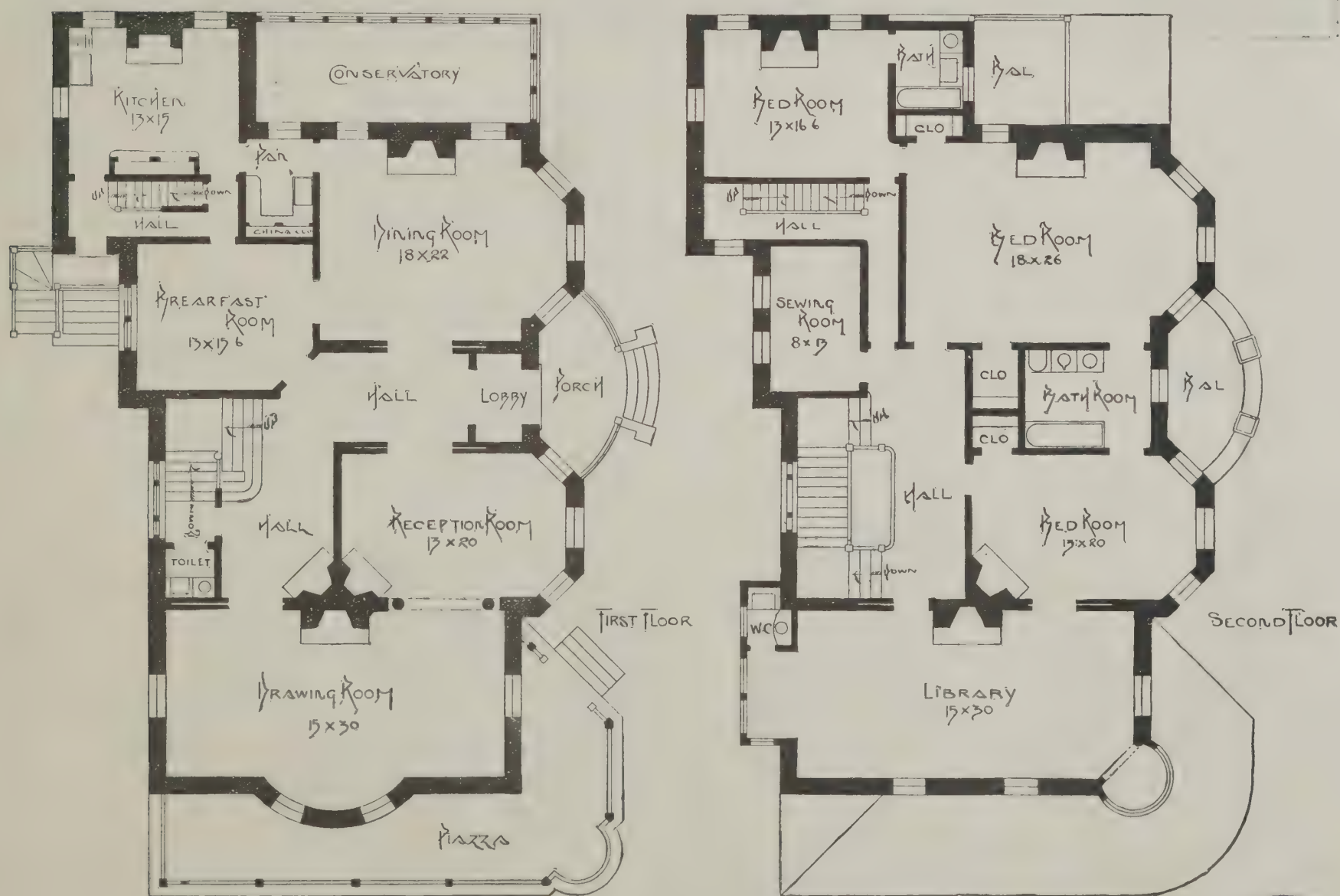
First floor Plan.



Second Floor Plan.





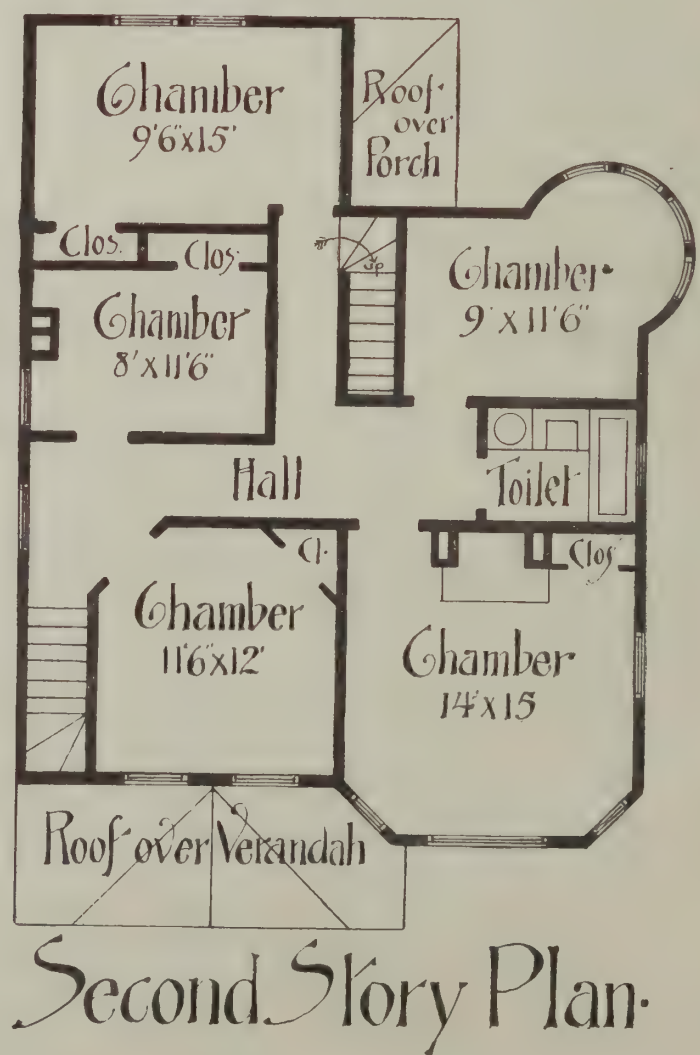


A RESIDENCE ON POWELTON AVE., PHILADELPHIA. -[See page 2.]





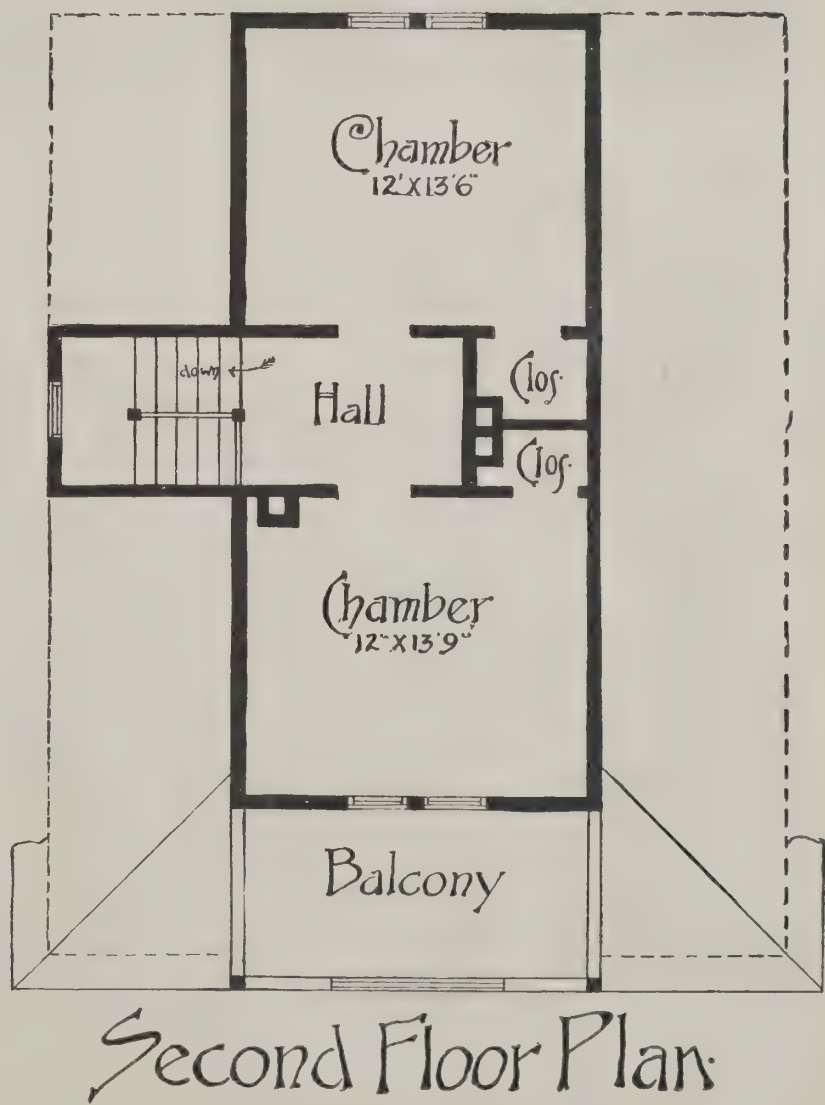
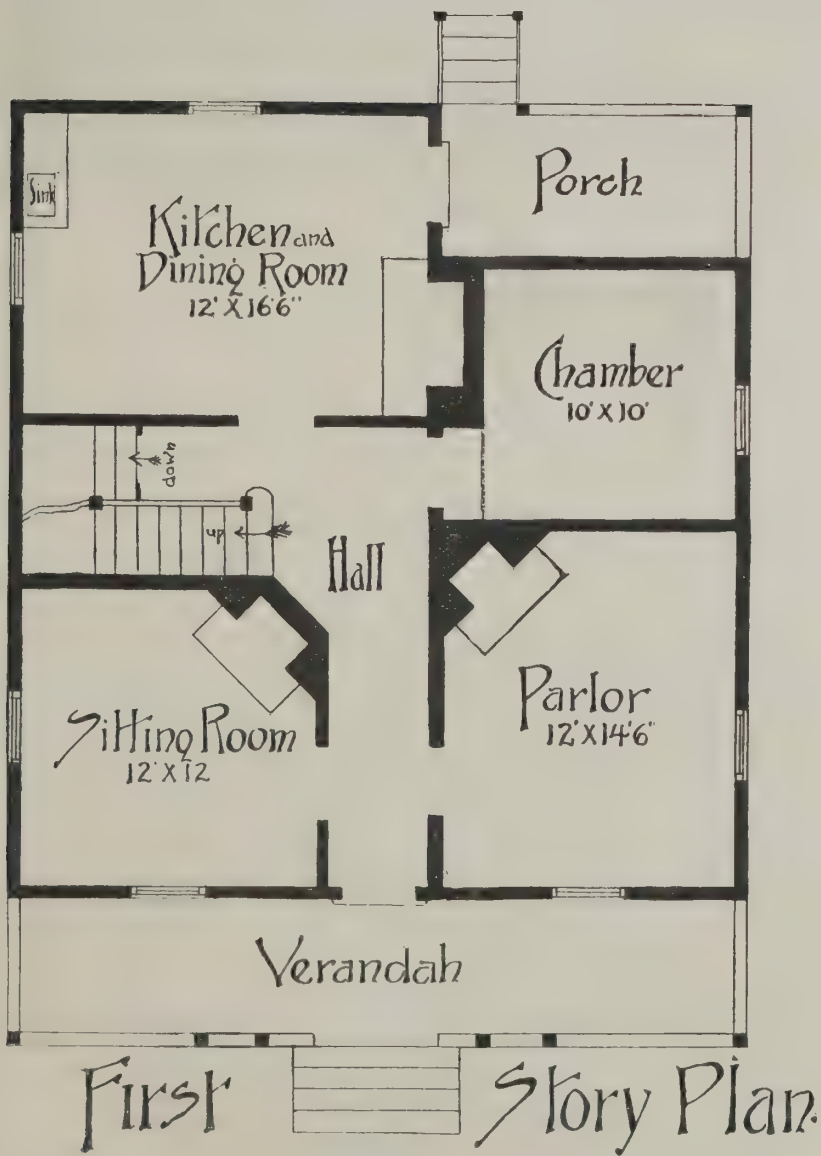
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A COTTAGE AT JACKSON PARK.—[See page 2.]

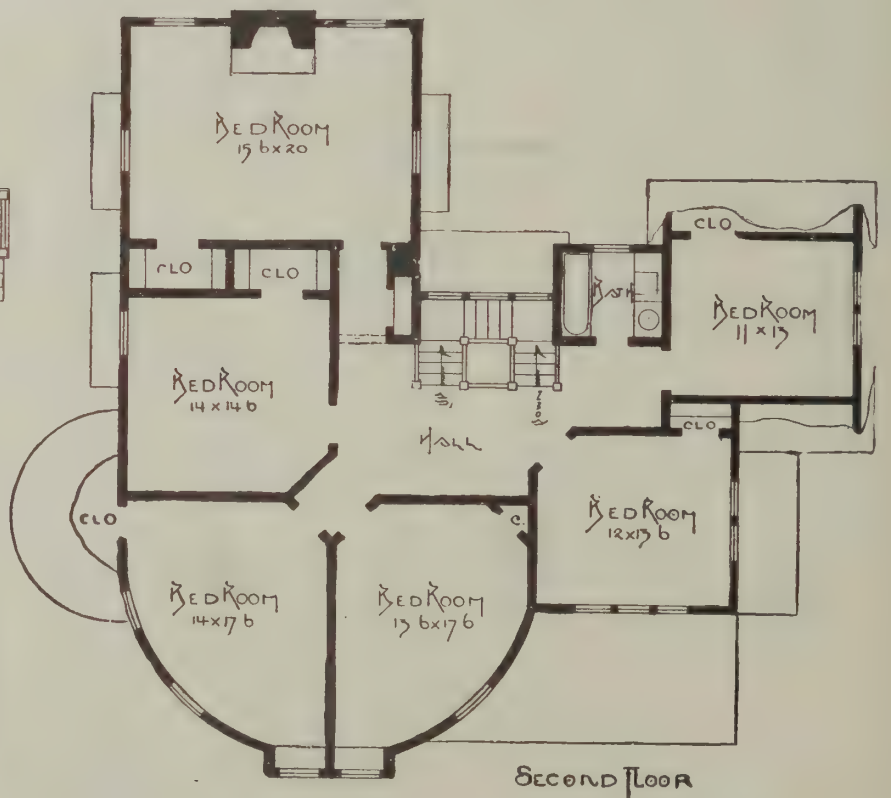
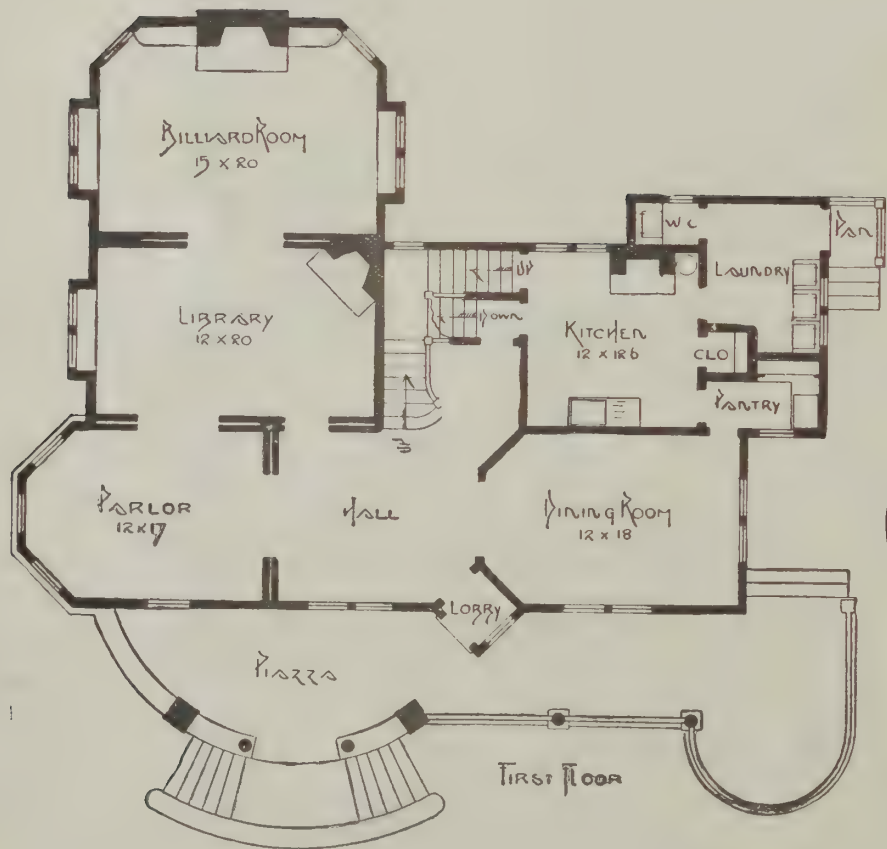






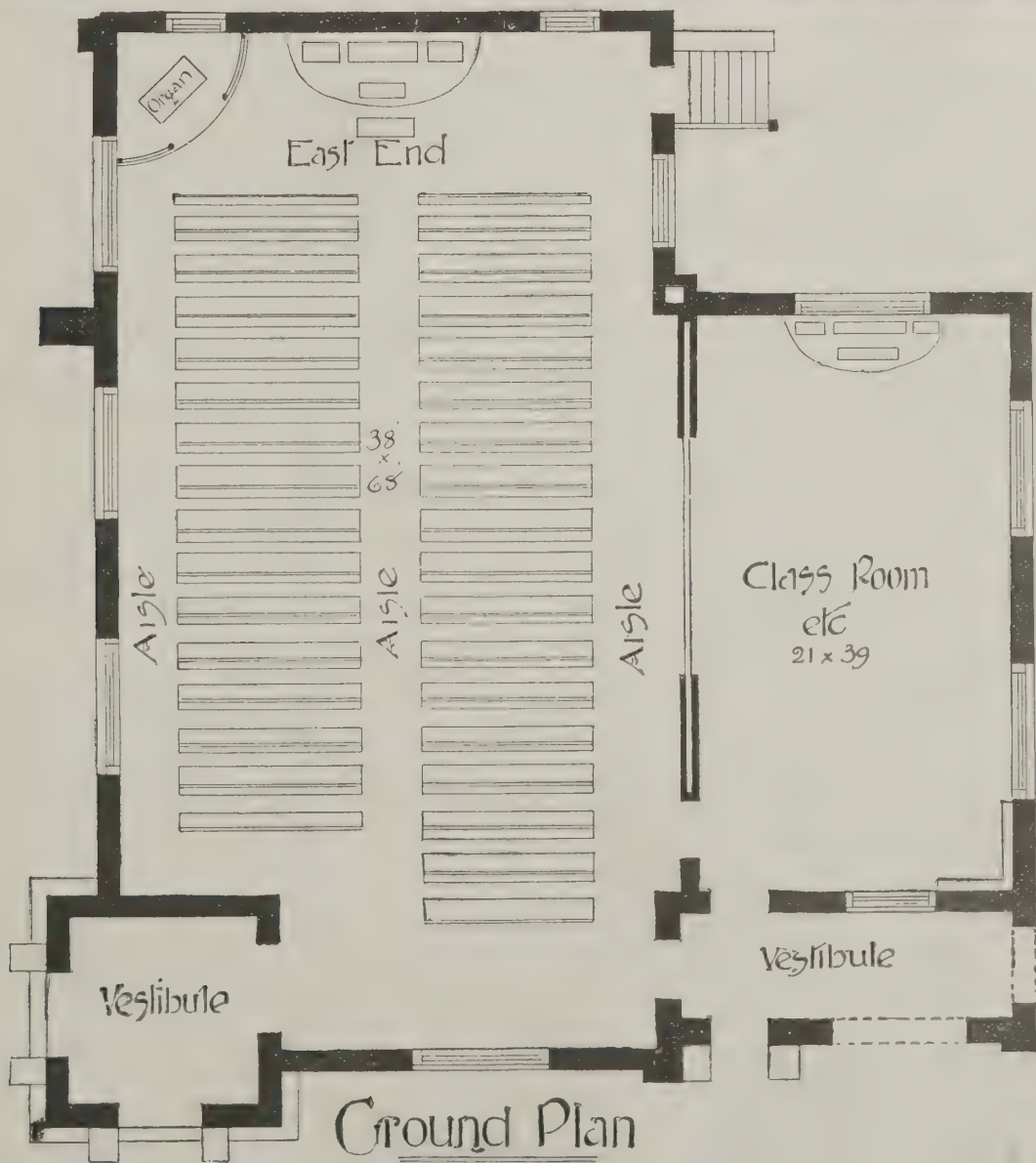
A COTTAGE ON MONROE AVENUE, CHICAGO.—[See page 6.]



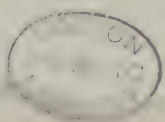


A RESIDENCE AT WAYNE, PA.—[See page 6.]

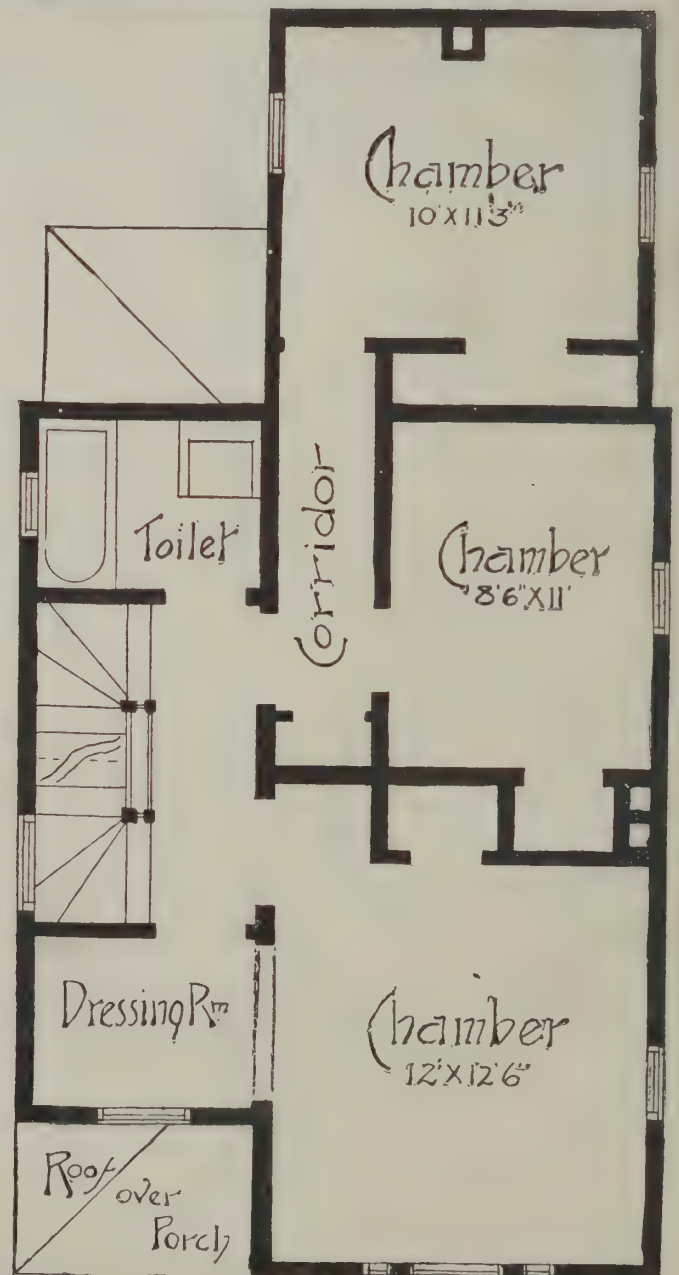
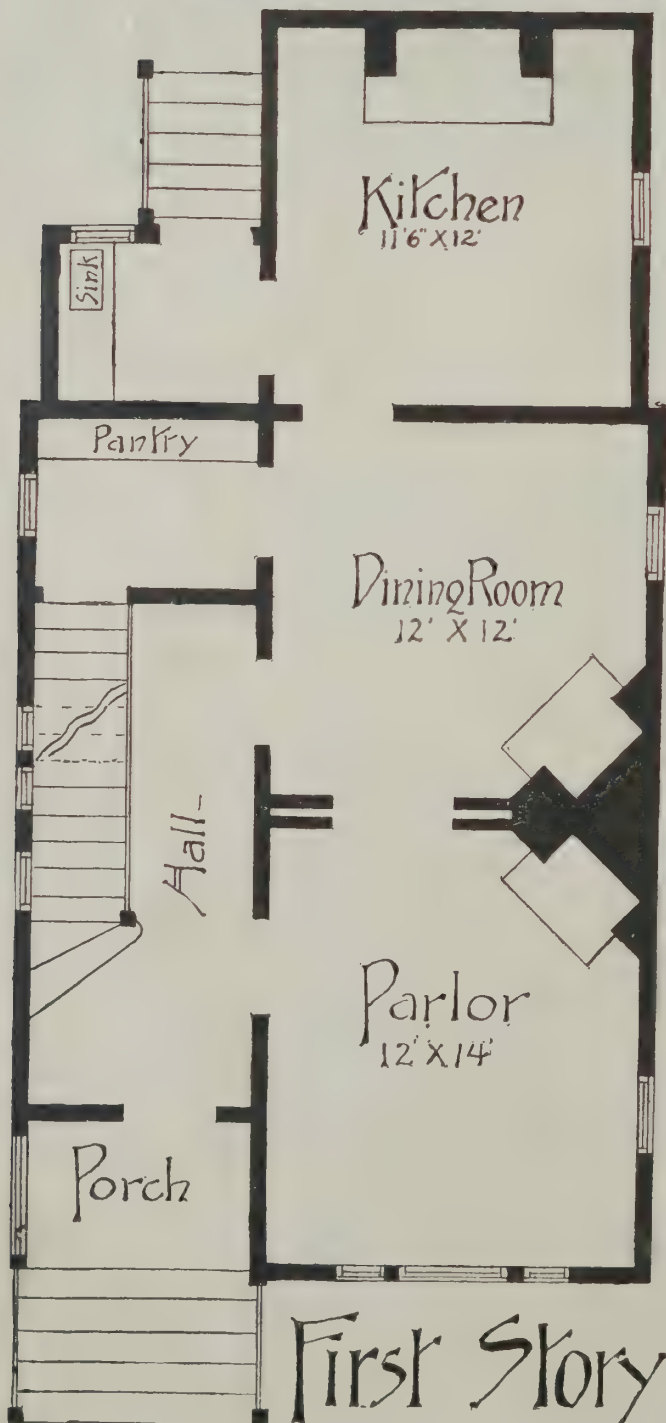




A CHURCH AT GLEN RIDGE, N. J.—[See page 6.]





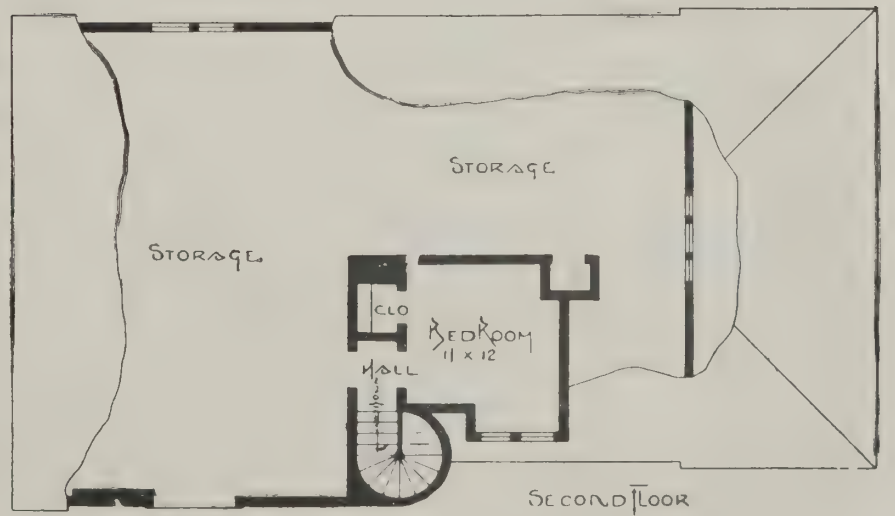
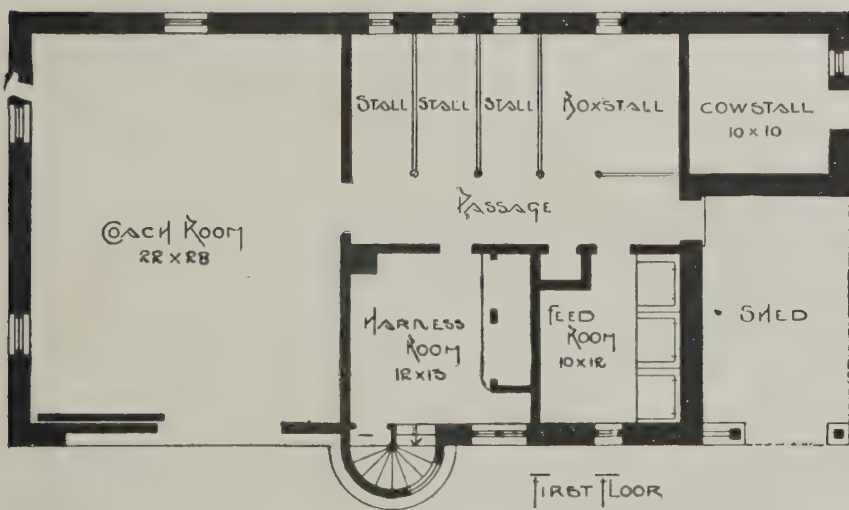


[See page 6.]

A COTTAGE AT LAKEVIEW, CHICAGO,



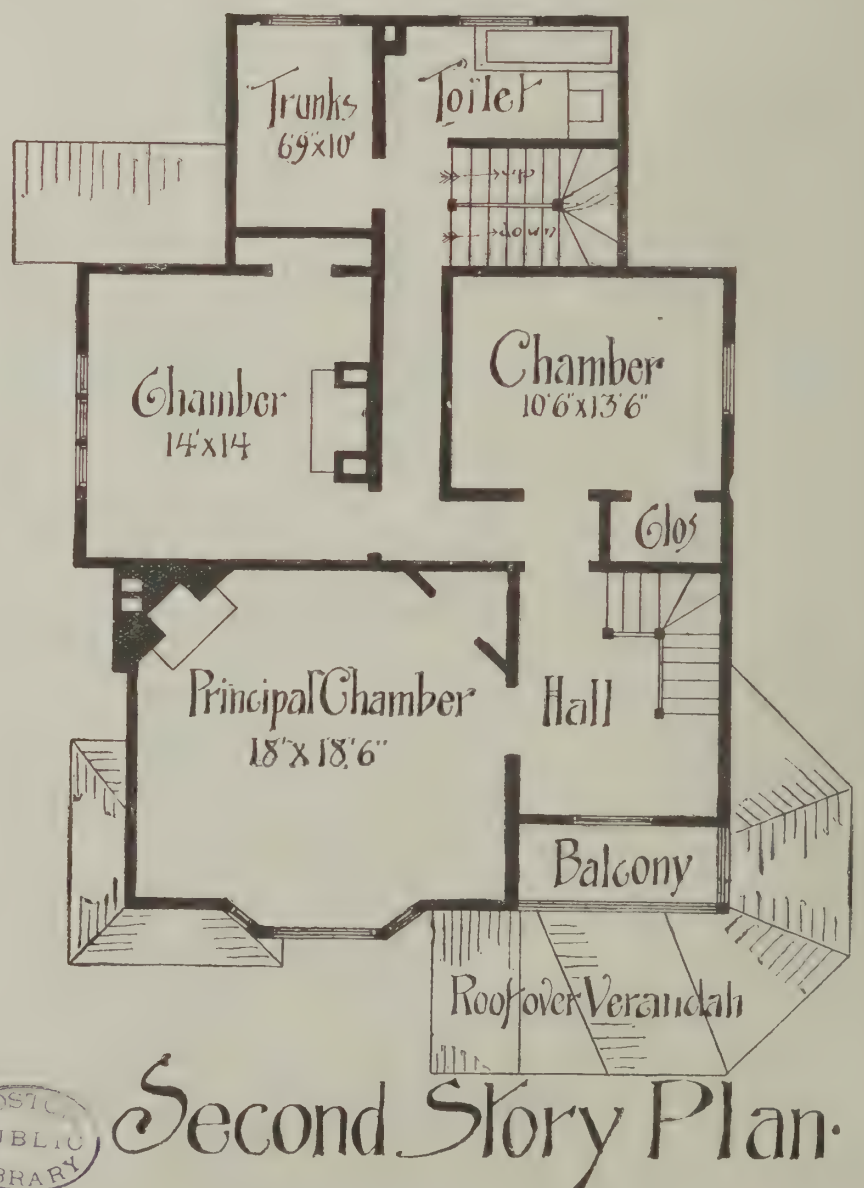
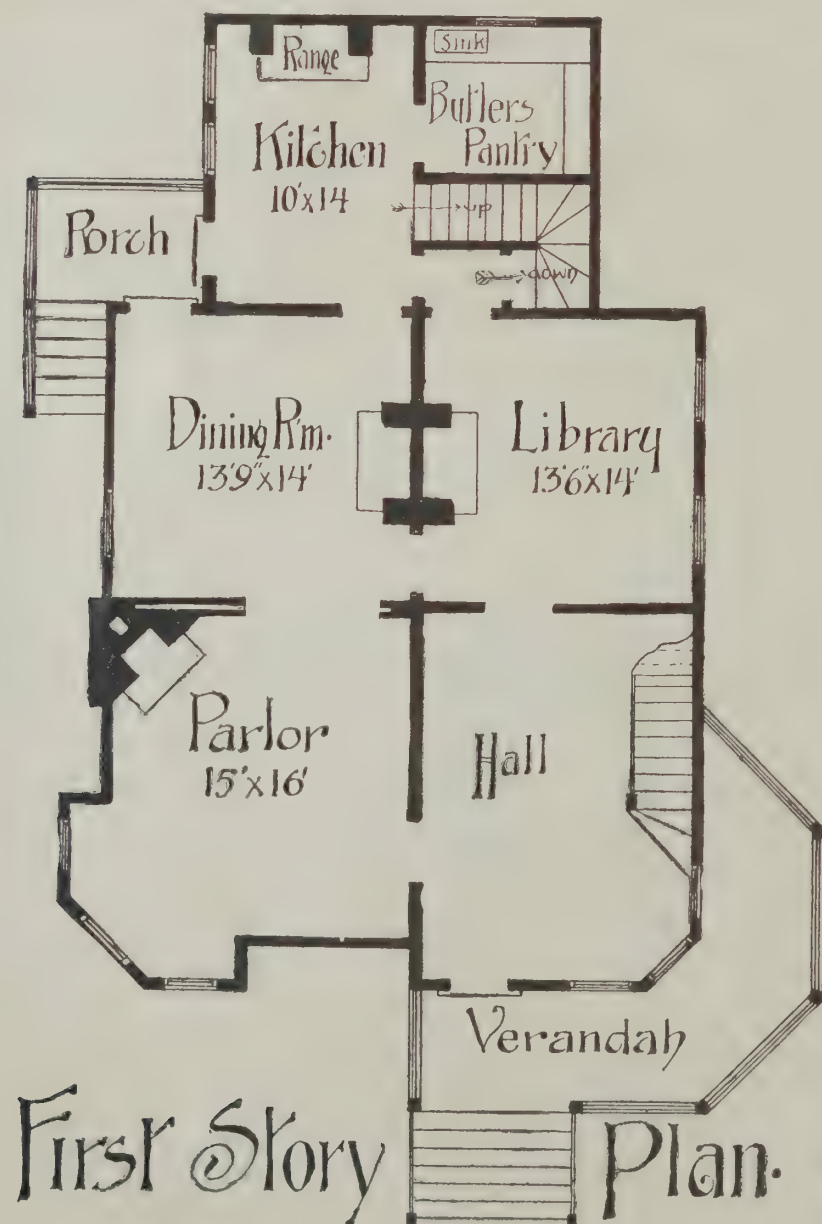




A CARRIAGE HOUSE AND STABLE.—[See page 19.]









How to Catch Contracts.

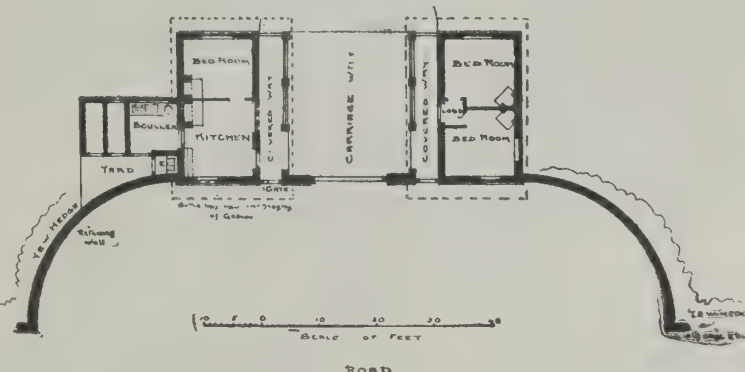
When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the SCIENTIFIC AMERICAN. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one, and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or "I should like it better if a dormer window were there," or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "it shan't cost you a penny." This liberal and agreeable treatment is highly appreciated by the customer. After his departure our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in brief, is the way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, your interests are sure to be promoted if you keep on hand and make yourselves familiar with the numbers of the SCIENTIFIC AMERICAN, so that you can readily display them to your customers, and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good

Black Birch.

The black birch, which is rapidly coming into favor, is a close-grained and very handsome wood and can be easily stained exactly to resemble walnut. It is just as easy to work, and is suitable for nearly if not all the purposes to which black walnut is at present applied. Birch is of much the same color as cherry, but the latter wood is now very scarce, and consequently dear. When properly stained it is almost impossible to distinguish the difference between cherry and walnut. In the forests throughout Ontario, birch grows in abundance, especially if the land is not too boggy. There is great difference in the wood of different sections. Where the land is high and dry, the wood is firm and clear, but if the land is low and wet, the wood has a tendency to be soft and of a bluish color. In all the northern regions it can be found in great abundance, and as the trees grow to a great size, little trouble is experienced in procuring it in large quantities.—*Saw Mill Gazette.*

LODGES, PARK HATCH, GODALMING.

These lodges will flank the principal entrance to the park. The walls are built of Bargate stone, and the roofs are covered with Horsham stone slates. The tim-

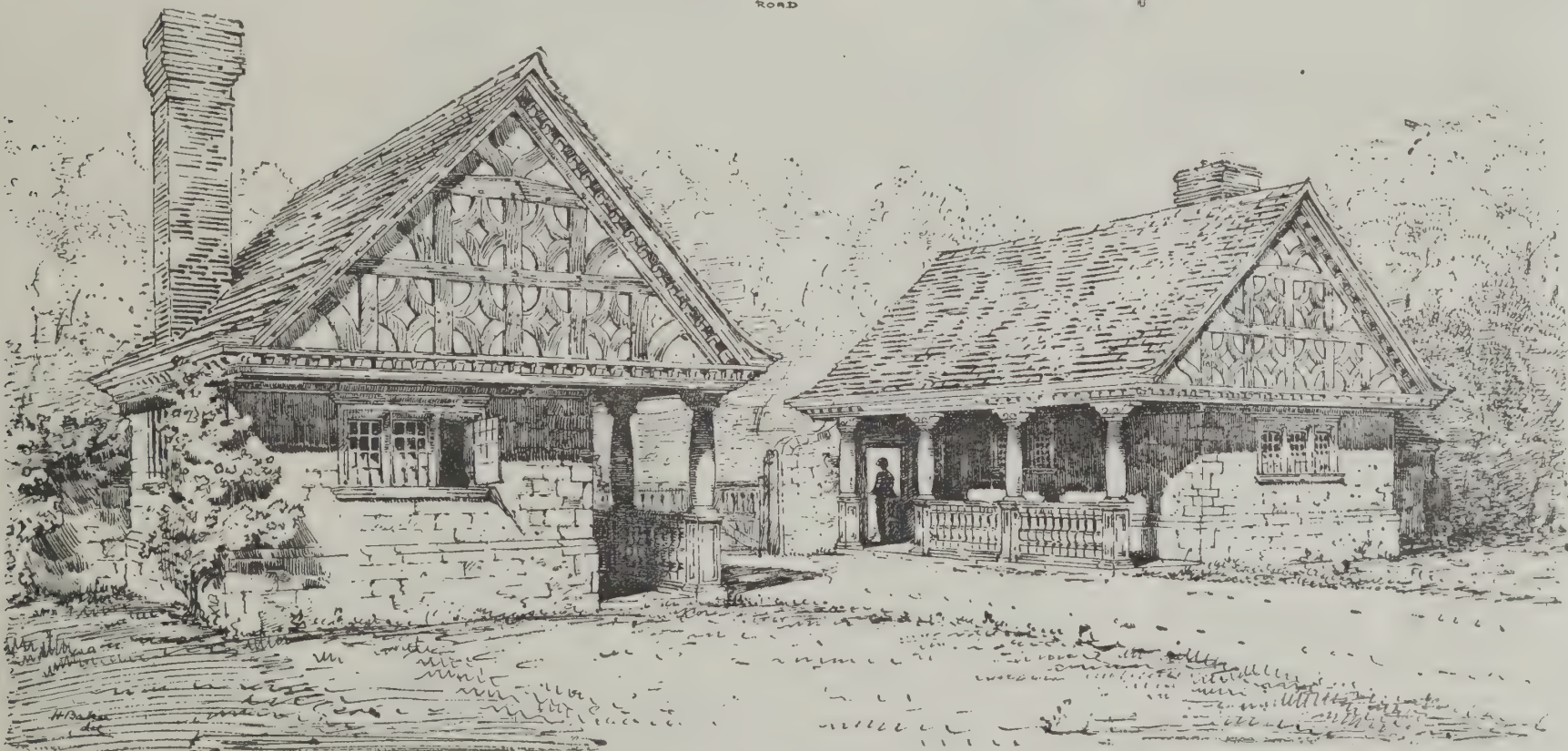


The usefulness and influence of our periodical is now widely and permanently established. Many of those who contemplate the erection of buildings now consult its pages for good plans and elevations, which are here given in numerical profusion.

The practical builder finds the SCIENTIFIC AMERICAN to be almost a necessity for himself and for his customers. With the plans and photographic elevations which we give, the builder is enabled easily to modify or to duplicate any of the structures we illustrate.

The photographs show the exact form, position, and details of the principal parts, and the builder is never at a loss how to proceed. Of these facts we have the most abundant and convincing testimonies. Many thousands of new buildings have been and are constantly being erected in all sections of the country from the plans given in the SCIENTIFIC AMERICAN, and as a result there is to be seen on every hand a marked and growing improvement in architectural styles. Builders now aim to select, even for the cheapest houses, the most tasteful designs, and of these the SCIENTIFIC AMERICAN regularly furnishes to them an abundant and satisfactory supply.

When the design of the building is selected and the work of construction begun, the next subject for consideration is the plumbing, the warming, the lighting, the hardwiring, the glazing, the adorning, the painting, the finishing, and finally the furnishing and household fittings of the building. In all of these matters the pages of the SCIENTIFIC AMERICAN teem with the most valuable information. Here may be found the illustrated announcements of the most reliable manufacturers of every class of materials, goods, and appliances required in buildings. In this department of the paper upward of two hundred engravings are given in every number. The value as a convenience



PARK ENTRANCE LODGES.

houses, and it does this quickly, for it employs the most effective of all means for rapid education, namely, the attractive and truthful picture. Nearly all the illustrations given are photographic plates made from the buildings, showing all the minute details. These plates are specially prepared for the SCIENTIFIC AMERICAN. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo. plates of the objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

The circulation of the SCIENTIFIC AMERICAN stimulates and promotes the building of new and improved houses. We know of towns where every builder is a subscriber, and all are full of business. People who see illustrations of handsome buildings are greatly influenced thereby. A notable improvement in architecture takes place in all towns and villages where the SCIENTIFIC AMERICAN freely circulates. Improved architecture increases the value of property. This is a self-evident proposition. Therefore, do all you can to boom this important and most useful periodical. This number begins a new year. Now is the time to renew your own subscription and to add another for your friend. Can you think of a better holiday present for him?

ber work in the gables is oak. The carriage way is stone pitched. The covered ways are paved with red brick. The lodges are placed between old yew hedges.

Messrs. Mitchell Bros., of Shalford, are the contractors, and the architect is Mr. Edwin L. Lutyens.—*The Builder.*

Some of the Merits.

The present number of our journal is the first of a new year, and presents an excellent opportunity for the entry upon our books of new subscriptions. We rely upon our large host of present readers to make known to their friends the merits and value of this periodical, thus aiding us in the augmentation of our list and the consequent improvement of the work.

One of the distinctive features of our publication is the presentation in every number, both in colors and in half-tone prints, of new and fresh collections of photographic views showing recently built dwellings, and other structures, with the floor plans. In this way we place before the reader a great variety of the very latest and most approved forms of construction, not from one locality only, but selected from every part of this great country. Wherever good taste prevails in the display of architecture, especially in the branch pertaining to homes and dwelling houses, there the artists of the SCIENTIFIC AMERICAN, with their cameras, do sooner or later make their appearance.

to the reader in having constantly at hand an illustrated, comprehensive directory of the latest productions cannot be overestimated.

"I WAS always under the thumbs of the architects," said a builder recently, "until I took the SCIENTIFIC AMERICAN. In the second number I found the perspectives and plans for a house which so tickled my customer that he gave me orders to build nine of them at once, on which I made handsome profits. The \$2.50 a year I pay for the SCIENTIFIC AMERICAN is a constant bonanza for me. With its aid I now do my own architecturing."

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



**THE WOMAN'S TEMPERANCE TEMPLE, CHICAGO.**

On the 1st of November, 1890, the corner stone of a magnificent edifice was laid in Chicago, designed to be the home and headquarters of the Woman's Christian Temperance Union, an institution which for many years past has exerted a vast influence for good in the rescue of victims of the rum-drinking habit. From a recent number of the *Union Signal* we take the accompanying engraving, showing this noble building as it will be when finished; and from an article in the same paper, by the president of the building association, Mrs. Matilda B. Carse, we glean the following particulars relative to the structure and the society to which it belongs:

The Woman's Christian Temperance Union was organized in Chicago in 1874. The operations of the Union became rapidly extended, and the necessity of a building became so apparent that in 1887 some of the prominent members formed an incorporated society under the title of the "Woman's Temperance Building Association," the purpose being the erection of a national building for the Woman's Christian Temperance Union. The project of the building was heartily endorsed at the national convention of the Woman's Temperance Union held at Nashville, 1887.

The financial plan of the building is as follows: The Temple will cost \$1,100,000. Of this amount \$600,000 has been raised in stock. It is to be bonded for \$600,000 more, allowing a surplus of \$100,000 for necessary expenses which will accrue before rentals are due. The stock has been subscribed by those favorable to the cause of temperance who are willing to accept five per cent. for the use of their money, allowing the W. C. T. U. the privilege of buying back the stock at par in five years or within twelve years.

The lot on which the Temple is built has a frontage of 190 feet on La Salle Street, by 96 feet on Monroe. It is valued at \$1,000,000. It is leased for two hundred years, without revaluation, at a rental of \$40,000 a year. Burnham & Root are the architects. The style is French gothic. It is to be thirteen stories high, and will be used as an office building, with the exception of the rooms set apart as headquarters of the national, state, and city organizations, and a hall on the first floor to be called "Willard Hall," in honor of the beloved leader and president, Miss Frances E. Willard. The hall will seat about seven hundred. It will have a separate entrance on Monroe Street, and is to be memorial in its character, being lined with marble. Upon the walls will be inscribed the names of noble women and men, as well as societies, who have given \$100 or over to the building fund. It will have memorial windows, and pedestals will support busts of illustrious persons who have lived and died for the cause of temperance. Memorial tablets will tell of the great and noble departed. From Willard Hall the incense of prayer will ascend every day in the year for the suppression of the liquor traffic and the salvation of the drunkard.

The building line at the tenth story retreats, and the immense roof, which contains three stories, commences breaking, as it ascends, into gothic turrets, from the center of which springs a fleche of gold bronze seventy feet high, surmounted by the beautiful form of a woman, with face upturned and hands outstretched to heaven in prayer, symbolical of the attitude of the Woman's Christian Temperance Union, as she protests against the laws and customs of the nation in regard to the liquor traffic, and appeals unto God for help to save her home, children and land from its destroying power.

The Geo. A. Fuller Co. have contracted to have the

building ready for occupancy in May, 1892. The rental of the building is estimated at \$250,000 per annum.

It is hoped that in five years the Woman's Christian Temperance Union will come into full possession of the building. They have already given, and pledged in gifts to the building fund, about \$200,000, and money and pledges are coming in daily with increased rapidity.

The temperance children of the land are greatly interested in building the Temple; a constant stream of small gifts is being received from them daily. Women of means are sending in gifts of \$100, but the rank and file are only able to give small sums, and their efforts to raise even a small amount of money for the building are truly pathetic.

The *Union Signal* of Nov. 6 contains a full account of the corner stone ceremonies, which were of the most interesting nature.

**The Scientific American a Help to Builders.**

When any one begins to think about building a

"cheap as possible house" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a heap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly then it is to their interest, as well as that of their customers, to have the *SCIENTIFIC AMERICAN* widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only \$2.50 a year. It is the cheapest, finest, and most useful architectural work

ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with splendid plates in colors, for \$2.50? They are not to be had except in the *SCIENTIFIC AMERICAN*, and for the money stated, instead of one number, we give a year's subscription. We say specially to architects and builders, you were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts, as the *SCIENTIFIC AMERICAN*. We therefore ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautify and improve our publication, and thereby increase your advantages.

**Improve Your Property.**

Whoever owns a town lot is apt to be looking forward to the time when he will erect upon it a dwelling, and at first blush he thinks he will be satisfied with a house of extremely moderate cost. This might be the correct thing to do if only his present monetary affairs were to govern, but there are other considerations which should not be overlooked. Perhaps the property is your chief possession, and you may have reason while you live to wish its value were increased. You may need to rent or sell it; or your children who come after you may be obliged to do so. Which do you think will most increase the value of the property—a poorly built, cheap house, or a substantial, attractive and comfortable one? Which will sell the easiest? Which will rent for the most? Which tends

to raise the value of property in a community—good and tasteful dwellings or flimsy and common-looking concerns? We say to every lot owner, when you set about the improvement of your property, do your level best to put up a good building, for when completed it is there to stay and will give you satisfaction. A first class house is almost like a deposit of gold in a sound bank. You can always sell it or rent it at the highest market price. Everybody wants to live in a good house; nobody desires a poor one.

**PLANS AND SPECIFICATIONS.**

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.



**THE WOMAN'S TEMPERANCE TEMPLE, CHICAGO.**

home he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the *SCIENTIFIC AMERICAN*. Here, to his surprise, he finds spread before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The good wife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost insensibly directed toward the better class of houses, of which plans and photographs are also given. And on studying these better houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a

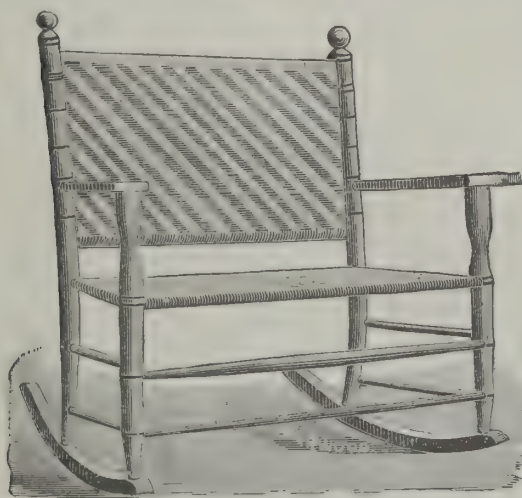


## AN IMPROVED ARTICLE FOR PLASTERING, TILING, AND CEMENT WORK.

The illustration represents a novel description of moulds and plaster slabs, and method of making the slabs, to be attached to the interior or exterior walls of buildings and their ceilings, for the reception of brown and finishing coats. This slab is primarily designed as a foundation for plastering, in which respect it is designed to be superior to all other materials, taking the place of the ordinary wood lathing and the various forms of metal lathing, while it is also adapted as a foundation for cement work, and for making a permanent and effective fireproof floor on top of boarded floors. The making of these slabs forms the subjects of two patents, issued to Mr. Thomas Curran. The moulds in which they are made are of heavy rubber, formed by means of suitable die plates with the requisite undercut longitudinal bars and marginal borders, whereby the mould can be readily removed after the plaster which has been poured into it has set. Fig. 2 shows a portion of such a mould, Fig. 1 representing its removal from the hardened plaster, and Fig. 3 shows a section of the formed slab, which is preferably made four feet long, sixteen inches wide, and five-eighths of an inch thick, the dovetail ribs on its surface rising about a quarter of an inch from the body of the slab. In the composition of the slabs, plaster, lime, alum, and fiber are used, the fiber being saturated with pyrodine liquid to render it fire and water proof. It has been found in practice that cocoanut fiber is a strong and excellent material for the purpose, while being also comparatively inexpensive. The slabs thus made have sufficient elasticity to permit of some bending, while they afford a good hold for the large-headed galvanized nails which are preferably used in fixing the slabs in position on the studding or beams of walls and ceilings. These slabs afford especial facilities for obtaining fine cut stone effects with Portland cement on the exterior of frame houses, and they can be used as a foundation for tiling on walls, ceilings, and on top of boarded floors. The moulds are also adapted for producing dovetail grooves on all kinds of plaster blocks. They have been thoroughly tested by the inventor, who is a practical builder, and to whom application for further information may be made, at No. 135 Broadway, New York City.

## THE SINCLAIR DOUBLE ROCKER.

The quite original and very comfortable style of seat shown in the accompanying illustration represents one specimen of a line of "Common Sense" furniture manufactured by Mr. F. A. Sinclair, of Mottville, N. Y., for which the maker has established a wide reputation. The articles of his production have long had the distinction of being eminently serviceable, strong, and durable, while substantial comfort to the user has



DOUBLE ROCKER.



COTTAGE TABLE.

been the first consideration in their design. The result has been that they have a very extended market among those who buy furniture for solid usefulness rather than for looks.

## A CARRIAGE HOUSE AND STABLE.

We present on page 15 a stable combining both beauty and convenience, which has been erected for Mr. Alfred C. Rex, at Chestnut Hill, Pa., and from plans prepared by Lindley Johnson, architect, of Philadelphia, Pa. Our engraving is from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.



CURRAN'S GROOVED PLASTER SLAB.

Dimensions: front 60', side 31'. Walls of first story, except tower, are built of rock-faced, Chestnut Hill stone, laid at random. Tower and rest of building of wood, covered with shingles, painted colonial yellow, with bottle green trimmings. Roof shingled and stained moss green. Coach room of good size, is well lighted and furnished with carriage wash. Stable contains three single stalls and box stall, all fitted up with the usual ornamental iron furnishings. There is also feed and harness room, the latter having stairs leading to man's bedroom and storage loft on second floor.

The interior throughout is ceiled with narrow beaded yellow pine, finished natural with hard oil. The cow house, 10' x 10', is entirely separate from main building. Cost \$1,800 complete.

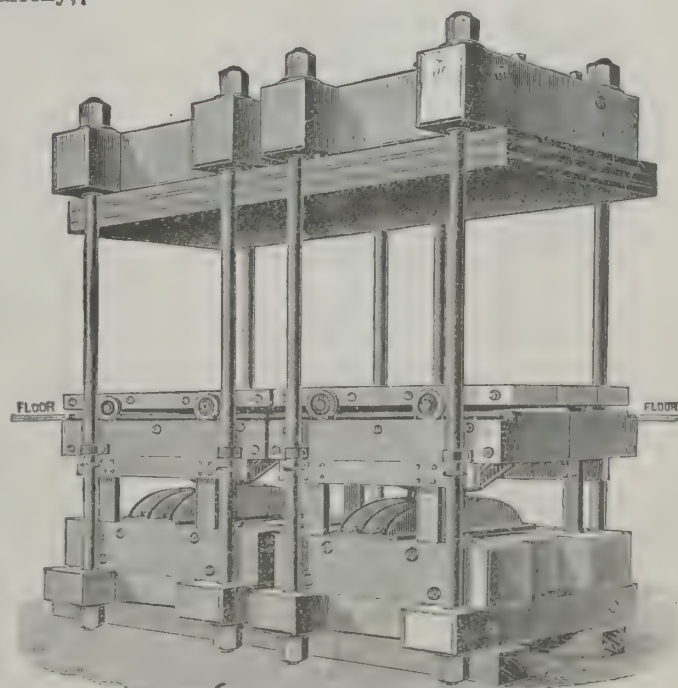
## A COTTAGE AT AUSTIN, CHICAGO.

Two floor plans and a photographic view of Mr. Moore's cottage, Park Avenue, Chicago, are given on page 16. The cottage is prettily situated and is surrounded by lawns. There is a veranda 4 ft. 1 in. from the grade line, extending half way across the front and round to the middle of the north side. The main hall opens off this veranda. The parlor is 15 ft. by 16 ft., and is well lighted from a bay window. It has an angle fireplace, and is entered direct from the hall or by sliding doors from the dining room. The dining room is 13 ft. 9 in. by 14 ft., and is entered either from the parlor, library, kitchen, or rear porch. The library is 13 ft. 6 in. by 14 ft., and is well lighted. It is entered from the kitchen by a vestibule, or from the dining room or hall direct. The kitchen is 10 ft. by 14 ft., is fitted with every convenience, and a butler's pantry communicating. It also has direct entrance from the rear porch. The second floor contains three comfortable chambers, with closets, trunk room, toilet room, etc., also balcony; servants' rooms upstairs on attic floor. The basement story is of stone, the first and second stories of frame covered with clapboards and shingles respectively, and the roof shingled. The total cost is estimated to have been \$4,200.

Our engraving was prepared direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

## AN IMPROVED VENEER PRESS.

The press shown in the accompanying illustration, which was specially devised for the use of carpenters, cabinet makers, and finishers of fine wood work generally, is one of a great variety of presses manufactured by the Boomer & Boschert Press Company, of Syracuse, N. Y., a firm which has a wide reputation for the excellence of design and thorough workmanship shown in its productions. The press is arranged for work to be run into it on cars, and is double, each press being adapted for operation independently, or for long work both may be run together, taking in pieces 35 inches wide by 10 feet long. The rams have a thrust of 20 inches, and there is a clear space of forty inches for work. The firm also make a single press taking in work of 36 by 60 inches dimensions, and furnish single and double power pumps for the operation of these presses.



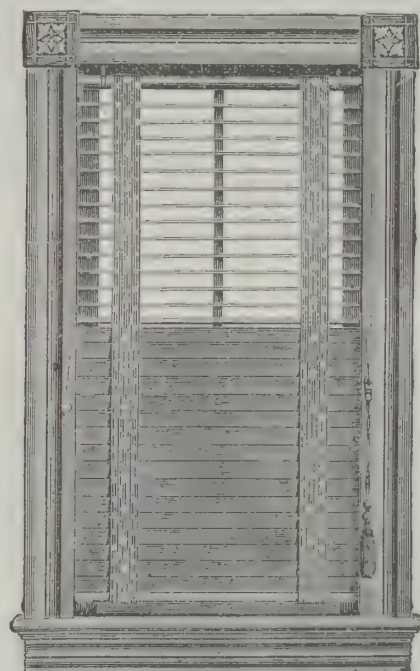
BOOMER &amp; BOSCHERT'S HYDRAULIC VENEER PRESS.

## Our Last Year's Volume.

If any of our readers desire to possess themselves of one of the finest collections of building plans ever presented to the public, we advise them to secure a bound collection of the numbers of our Building Edition for last year, 1890. We furnish the volume complete, bound in paper covers, for \$3.50, and in stiff covers for \$4.50. The volume is embellished with elegant plates, in colors, in addition to which is the entire series of photographic plates of the buildings we have illustrated during the past year, including the floor plans of the same. To builders, architects and all who are looking for the best examples and the best suggestions respecting dwellings, whether of high or low cost, this collection will be found most convenient and of permanent value.

## THE "ALBANY" VENETIAN BLINDS.

We present herewith a cut of the "Albany" (Phillips' patent) Venetian blind, the simplicity of the construction of which has commended it highly to architects and contractors. It is readily removed when "cleaning house," and replaced without the help of a carpenter. This blind will hang between stop beads, if necessary, thus making it serviceable in frame houses where there are no window jambs. The following are some of the more notable buildings in which these blinds are in use: The Chicago Auditorium and the Hyde Park Hotel, Chicago; the new U. S. military barracks at Fort Sheridan; the new Boston Court House; the State Capitol at Albany, N. Y.; the Mark Hopkins Memorial Building, Williams College; the State Normal School, Framingham, Mass.; Vice-President Morton's house at Ellerslie; and many elegant apartment houses in New York City. The New York State Capitol commissioner, Isaac G. Perry, writes of these blinds that they "are



THE "ALBANY" VENETIAN BLINDS.

economical, convenient to operate, easy to adjust, and durable. I feel no hesitancy in recommending them."

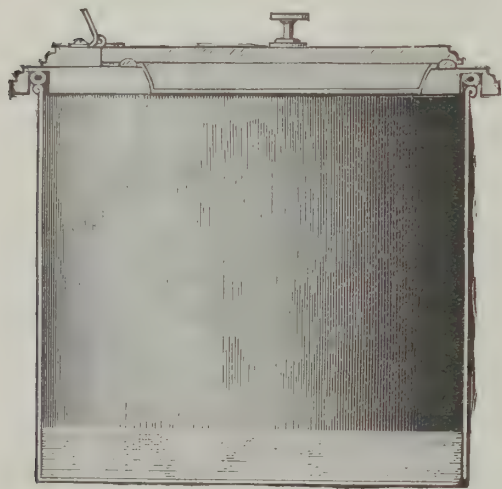


**A CONVENIENCE FOR HOSPITALS, FAMILIES, ETC.**

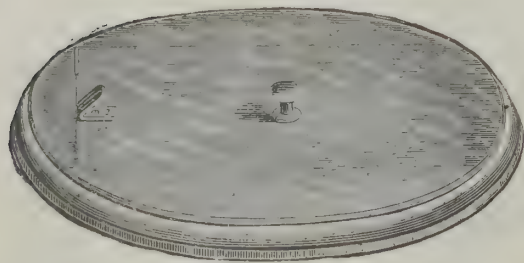
One of the latest improvements for the comfort of patients or invalids unable to leave their rooms, or for country homes wanting in the indoor conveniences usually found in city buildings, forms the subject of the accompanying illustrations. It is a commode which, when closed, will be absolutely tight and inodorous, a beveled offset surrounded by a rubber packing on the under side of the seat cover fitting closely the beveled edges of the seat opening. Its weight complete, with two quarts of water, is fourteen pounds, so that it is easily moved from one place to another, and its polished mahogany or black walnut seat, with flap and concaved rubber ring, can be easily taken off when the commode requires cleaning. Mr. Louis Waefelaer, a manufacturer of and dealer in sanitary specialties, of



SAME HEIGHT AS A WATER CLOSET.



SECTIONAL VIEW OF COMMODE.



SEAT FOR COMMODE.

WAEFELAER'S INODOROUS COMMODE.

No. 54 Beekman Street, New York City, is the patentee and sole manufacturer of this improvement.

**Artistic Wall Decorations.**

The American Decorative Company, of 116 Pearl Street, Boston, claim for its patented "Lignomur" that it is "the best interior decoration for the walls and ceilings of buildings." The company is constantly making improvements in the quality and artistic beauty of the goods. Just now the company is getting ready for early presentation a line of decorative goods designed to produce effects equal to those obtained by the process of "wiping off," familiar to decorators, but at a much lower cost.

**The Education of Customers.**

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise and progress of architecture from the earliest ages. The aggregate circulation of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The SCIENTIFIC AMERICAN occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is sensibly felt by architects and builders in all parts of the country. Their services are in greater demand because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the SCIENTIFIC AMERICAN brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the SCIENTIFIC AMERICAN freely circulates, there architects and builders thrive, there property is intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The SCIENTIFIC AMERICAN has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to their customers, who vastly exceed the former in number.

This, also, is the reason why the SCIENTIFIC AMERICAN has the largest advertising patronage of all the architectural papers. It is these customers who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the walling, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the SCIENTIFIC AMERICAN," say advertisers, and that settles the question.

When our builders' edition first appeared, nearly all the architects were down upon it. They said we gave away their plans free to the public, and the effect would be to take bread from their mouths. But they now find, by actual experience, they were mistaken. The SCIENTIFIC AMERICAN promotes their business by educating their customers, and creating a demand for the higher and more profitable class of plans and designs.

**THE BUFFALO HOT BLAST HEATING SYSTEM.**

We illustrate herewith the latest patent appliances of the Buffalo Hot Blast System, in which the entire quantity of radiating surface is massed together into manifold sections, inclosed by a heater case of steel plate.

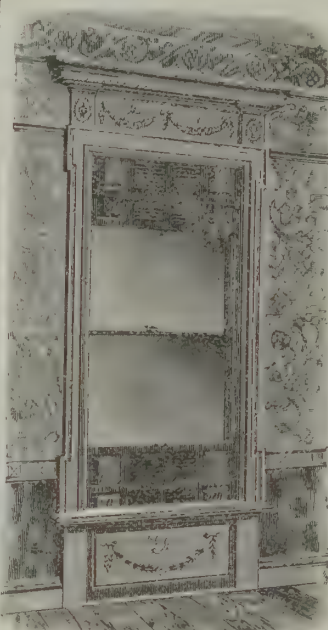
These sections differ in size and number according to the air space to be heated. Fresh air is taken directly from the outside of the building through a duct, and is either forced or exhausted over the steam pipe, the cut herewith showing the apparatus arranged for blowing through the heater, from which the air is conducted to different portions of the building. A properly planned outfit distributes the air evenly and secures a uniform temperature in all parts, both at floor and ceiling, without reference to outside temperature, ventilation being thus entirely independent of natural conditions.

These patented heaters are arranged to use both live and exhaust steam, or both together or separately, as desired, the supply of either being varied at the will of the operator, by the use of the Buffalo patented valve, placed between each manifold section. It is said that actual experiments have shown that one-fifth of the amount of lineal feet of one inch pipe required to heat a given number of cubic feet of air pipe, by direct radiation, will give equally as much heat when arranged in the form of a hot blast heater and dis-

tributed by the fan, while fresh air is assured at all times, heated to the right degree for comfort. This patent system of heating and ventilation is furnished by the Buffalo Forge Company, Buffalo, N. Y.

**THE "WILLER" SLIDING BLINDS.**

The accompanying illustration represents class "A" of the sliding blinds made by the Willer Manufacturing Company, of Milwaukee, Wis.



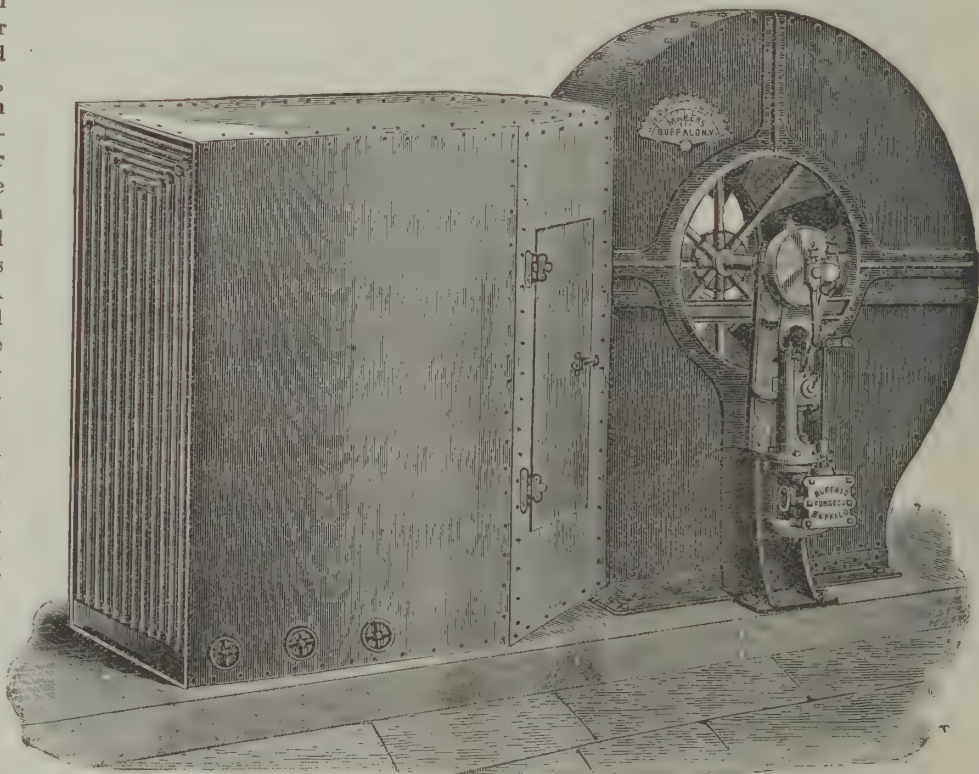
This class is made with four sections of blinds to the window, arranged in such a manner that two sections go into a bottom and two into a top pocket. The guideways have two grooves, each extending into both pockets, and the entire window can be uncovered by sliding the different sections into their respective pockets. The handsome copyrighted catalogue No. 9, recently issued by the company, gives full particulars and fine illustrations of the various styles of blinds, window and door screens, stairwork, etc., which they make.

ELEGANT SLIDING BLINDS.

**Mueller's Water Pressure Regulator.**

The simple and practical device furnished by the Mueller Manufacturing Company, of Decatur, Ill., for regulating the pressure of water in buildings, whether the supply be from a stand pipe or reservoir system, or where hot and cold water are used, has commended itself highly to plumbers and architects, by whom it has been held in constantly increasing favor during the past eight years. By its use a heavy, unsteady pressure is obviated, while water hammer is entirely avoided, and a uniform pressure is obtained, such as is invaluable in preventing accidents, while effecting great saving in all cases where water is sold by the measurement of a meter. The regulator allows the pressure to be set as desired, no matter what may be the pressure in the mains.

In connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those



THE BUFFALO HOT BLAST STEAM HEATING APPARATUS.

who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.



# SCIENTIFIC AMERICAN

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ARCHITECTS

NEW YORK, FEBRUARY, 1891.

EDITION.

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Single Copies, 25 Cents. No. 2.

## A CORNER OF A BOUDOIR.

Our illustration is from a colored drawing which appeared in the Royal Academy Exhibition last year. The chimneypiece, arch, and paneling of the room were finished in ivory white, door and furniture of dark mahogany. The frieze was an embossed paper, cream with gold background. Draperies, pale steel blue, and carpet background a darker shade of same color. The design and drawing are by Mr. J. Armstrong Stenhouse.—*Building News*.

### Non-Porous Walls.

The prevention of the saturation of ordinary brick walls is one of the many problems in modern buildings. Architects, with true conservative instincts, still cling to the solid brick walls, though sanitarians and hygienic builders have been preaching a crusade against them for many a year; and they still believe in solid walls, although it has been shown how easily all the beauty of solid moulded jambs and reveals can be produced in walls constructed with a cavity, and that the hollow wall has quite as much strength, if properly bonded by ties, as the solid wall, and can carry all the weight that is ever likely to be brought upon it. The preference for solid walls lies in the sentiment of the thing; the glory of ancient architecture has, in the popular mind, been associated with solidity and massiveness, and the thick stone wall, such as we see in the Tower of London, and in hundreds of our English castles and fortresses, has become a thing in the imagination that cannot be eradicated by any amount of scientific theory. The Englishman puts his faith in thick walls as symbolical of impregnable England. The Americans, and our colonists, who live in or have visited countries where timber abounds, are ready to assert the merits of wooden houses and log cabins, though they must have a liking for the old English wall of stone or brick. Their houses

and villas have a thin, tawdry look about them; the reveals to windows look meager; there is a lack of projection and shadow, which are such valuable features of English indigenous architecture. Even the half-timbered houses of the States cannot compare for picturesque qualities with those erected in England, where the original types of half-timber building are to be found. The timbers have a "skin deep" appearance; but the shingle wall of the States has merits which cannot be disputed. The shingle construction there adopted and perfected combines warmth and dryness in the colder and damp climates, and those who live in frame houses half built of brick and covered with clapboarding and shingles say they combine all the advantages of both systems. One reason of this is because there is a cavity—the walls are partially hollow. But there are advantages in the material; being a non-conductor of heat, it retains the warmth. Take for example the dwellings of this kind found in New York, Massachusetts and other States. The exteriors are shingled, and stained a bright sienna or painted red, with olive-green "trimmings;" the roof is also shingled and painted red. The interiors are finished in cherry or some hard wood like oak. There is considerable comfort in these well finished houses. Other dwellings are sheathed and papered exteriorly, perhaps the first story is clapboarded and painted colonial yellow, with bottle green trimmings; the second story is shingled and painted red. Sometimes the clapboarding is painted a gray, with trimmings of darker shade. Whatever are the artistic merits or otherwise of these wooden houses, they are certainly comfortable, while the ordinary brick villa is subjected to every discomfort in wet weather, owing to the porousness of the bricks that are generally used.

If hollow walls are objected to, there are remedial measures. Thus, Sylvester's process of repelling moisture is an old and simple plan that might be followed by builders before houses are let. It consists of

using two washes alternately for the surface of the walls, one composed of Castile soap and water, and the other of alum and water. The proportions are three pounds of soap to one gallon of water, and half a pound of alum to four gallons of water, both substances to be well dissolved before applying. The first soap wash should be laid on while boiling hot, with a flat brush, and a frothy appearance be produced. After twenty-four hours, when it will become dry and hard, the alum wash is to be applied warm, and should also be allowed to dry before a second coat of the soap wash is put on. These coats can be repeated till the walls are rendered impervious to water. The combination of soap and alum forms an insoluble compound which fills the pores of the brick. The reason why so many houses are uninhabitable through dampness is because the remedy is applied too late, when the bricks have become begrimed with soot. The solution should be applied to newly built walls, and in the manner we have described, thoroughly, not merely a weak solution improperly applied in about two coats. If the provision were made in the contract and specified, there would be little of the trouble afterward experienced by the tenants.—*Building News*.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.



A CORNER OF A BOUDOIR—DESIGNED BY J. ARMSTRONG STENHOUSE.



Scientific American.

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THE

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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A RESIDENCE AT MT. VERNON, NEW YORK.

The subject of one of our colored plates in this issue is a residence erected for Ferdinand Chivis, Esq., on Chester Hill, Mt. Vernon, New York. Henry S. Rapelye, architect, same place. Dimensions: Front 37' 6", side 45' 6", not including piazza. Height of ceilings: Cellar 7' 6", first story 10', second 9', third 9'. The dignified appearance of this house is enhanced by its ornamental piazza, balconies, lookout, etc. Underpinning of "rock-faced" bluestone. The superstructure above is of wood, clapboarded and painted light olive green with bottle green trimmings, relieved with English vermilion. Gables are covered with sea green slate, and the roof with Bangor slate, finished with a terra cotta cresting and finials. Hall and staircase are trimmed with quartered oak, parlor with cherry, mahogany finish, reception room with sycamore, dining room with quartered oak, antique finish. Fireplaces have hearths and facings of tiles, and bric-a-brac mantels of excellent design. Floors are laid of edge-grained North Carolina pine. Kitchen, laundry, rear hall, and pantries are wainscoted and trimmed with North Carolina pine finished with hard oil. These apartments are fitted up in the most convenient manner. Kitchen is provided with a dumb waiter to billiard room on third floor. Second and third floors are trimmed with whitewood finished natural, the former containing library, three bed rooms, and bath room. All doors on second floor have transoms over. There are four bed rooms and billiard room on third floor. Cemented cellar contains a steam drying room, furnace, etc. Heated by steam. Cost \$12,000 complete, ready for occupancy. On page 23 we give a plate showing another view of this house. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

A RESIDENCE AT AUBURN PARK.

One of our colored plates this month represents in perspective, with two floor plans, a residence on Dickey Street, Auburn Park, Chicago. The house is pleasantly situated, being set back from the road and surrounded by lawns and shrubs. A piazza extends from the principal entrance on the front half way round the side 4 ft. 8 in. above the grade line. The front entrance opens into a hall 13 6 by 18' 6, which contains fireplace, handsome oak staircase and alcove "nook" with seat. The parlor measures 16 by 18 ft., and opens off the hall to the left, by portieres. It contains handsome angle fireplace and bay window. The dining room is situated at the rear of the parlor, measures 11' 6 ft. by 16 ft., contains angle fireplace and is lighted from mullioned window.

The library is placed abreast of the dining room and measures 15 ft. by 17 ft., and is lighted by large bay window. The kitchen is at the rear of the dining room and is 15 ft. by 16 ft. It contains range, sink, etc., and back stairs. There are five chambers on second floor, with closets and toilet room. The basement and first story are of rock-faced stone and the upper portion of frame construction. The total cost is estimated at \$7,000.

Our engraving was prepared direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

Henry Schliemann.

Dr. Schliemann was the son of a Lutheran minister. He was born in Aukershausen, Mecklenburg, in 1822. His father was a great student of Greek, and his son early received a strong bent toward the same line of study, and it is said that when a mere boy he determined to discover Troy. After five years of exhausting and distasteful employment with a grocer, which he was forced to engage in from poverty, he got a position as correspondent and bookkeeper with an Amsterdam mercantile house. In 1846 the firm sent him to St. Petersburg as their agent. His business prospered, and he eventually acquired a fortune. He traveled a great deal in the next few years, and learned many modern languages. His knowledge of ancient and modern Greek was thorough.

His archæological work now began. He was the possessor of a fortune. He devoted the rest of his life to investigations among the ruins of Greece and Asia Minor. His first important work on archæology was published in 1869 in French, and was entitled "Ithaque, le Péloponnèse, Troie; Recherche Archæologique." Five years later, in 1874, appeared his "Troy and its Remains," giving the results of his excavations on the site of ancient Troy and the Trojan Plain. He obtained permission in this year from the Greek authorities to prosecute his researches at Mycenæ. Here he made the singularly interesting discovery of five ancient tombs, which he identified as the ones pointed out to Pausanias, the ancient historian of Greece, as those of Agamemnon and his companions, buried by Ægisthus. When it is remembered that these tombs were subjects of local tradition in the days of Pausanias, an idea can be acquired of the insight into the past given by Dr. Schliemann's researches. His discoveries of objects of art in the precious metals were very numerous. A collection of them was exhibited in

London in 1877 at the South Kensington museum. He has sold many collections to the different art museums of the world.

His home life was influenced by his classic tastes. His wife was a Grecian, the daughter of an Athenian. Greek was the language of his household, even his servants receiving Greek names. His two children were named respectively Agamemnon and Andromache. In the course of his wanderings he found himself in California when that State was admitted to the Union. He became himself a United States citizen.

Only last year he was commencing new explorations in Asia Minor, under a firman of the Turkish government. His published works were extensive and numerous. His income enabled him to prosecute a work that gave him world-wide fame.

His relations with America were many. It was in the early days of California that he there laid the foundations of his fortune, which he increased during the Crimean war while established in St. Petersburg. His death was announced on December 27, 1890. It occurred at Naples, Italy. Few lives have been more fruitful of usefulness.

Jarrah Wood.

Considerable interest in the utilization of woods grown in the English colonies was awakened by the Colonial and Indian Exhibition of 1886, and this interest seems to have been steadily increasing since that date. The authorities of the Royal Gardens at Kew have recently issued a report on the jarrah timber (*Eucalyptus marginata*), of which the following are the salient features:

Various species of eucalyptus have been recommended for use in England for outdoor work where strength and durability are specially desired. The freight charges from Australia, where all the species are native, are heavy, and this is one reason why the wood has not been generally introduced. Another reason is that its intense hardness makes it well nigh impossible to work in with English tools. The species of eucalyptus to which most attention was drawn at the Colonial and Indian Exhibition as structural woods was jarrah, *Eucalyptus marginata*, Smith, and the karri, *Eucalyptus diversicolor*, F. Muell. Much more attention has since been given to the development of the jarrah than the karri. The tree which produces it grows generally to the height of 100 feet, but sometimes to 150 feet. It is found only in Western Australia, extending over the greater portion of the country from the Moore River to King George's Sound, advancing to Cape Leeuwin, forming mainly the forests of these tracts. Baron Mueller, in referring to these woods in his "Report on the Forest Resources of Western Australia," says:

"The wood has attained a world-wide celebrity. When especially selected from hilly localities, cut while the sap is least active, and carefully dried, it proves impervious to the borings of the chelura, teredo, and termites. It is extensively in demand for jetties, piles, railway sleepers, fence posts, and all kinds of underground structures, and it is equally important as one of the most durable for the planking and frames of ships. It is also much used locally for flooring, rafters, spars, and furniture. It is one of the least inflammable for building structures, and one of the best in Western Australia for charcoal."

Vessels constructed of jarrah wood have, after 25 years' constant service, remained perfectly sound, although not coppered. The wood has been tried at three places in the Suez Canal, at Suez, Port Said, and Ismailia, and after having been down seven years the trial samples were taken up in order that a report might be forwarded to Paris, and the certificate of the resident engineer pronounced the timber to be practically indestructible. Jarrah wood has been used for street pavements in Melbourne, Australia, and in the King's Road and Westminster Road in London.

The eucalyptus is of very rapid growth, and the timber, when green, is very easily felled, split, or sawn up, but when dry it becomes very hard. The bark of many of the species abounds in tannin, and has become to some extent an article of commerce. Some of it is said to be twice as strong as oak bark. The bark of some species is remarkable for its hardness; while some throw off their outer bark in longitudinal strips or ribbons, which, hanging down from their stems and branches, present a very singular appearance.

BRONZE CASTING.—According to R. H. Park, of Florence, a sculptor, the art of casting large statues in one piece, as practiced by Benvenuto Cellini in casting the Perseus, which has been a lost art, has been rediscovered. The process is called *cerre perdue*; it is a wax process. The clay model is made, and the plaster reproduction is taken from it. From this the matrix is made, and the matrix is furnished with a core. The matrix is coated with wax the thickness of the bronze. The mould is then heated, and the wax runs out of a hole in the bottom, then the bronze is poured in. The results are superior, but the cost is increased by about \$1,000 per statue.









A RESIDENCE AT AUBURN PARK, CHICAGO.







A RESIDENCE AT MOUNT VERNON, N.Y.



First  
Story Plan.



Second  
Story Plan.









**The Scientific American a Help to Builders.**

When any one begins to think about building a home he is apt to say to himself, "I will have the house built just as cheaply as I can, at the same time make it as attractive in exterior and as comfortable within as possible." The next step is to search for plans, and perhaps some friend directs him to the **SCIENTIFIC AMERICAN**. Here, to his surprise, he finds spread before him a wonderful variety of photographs of neatly constructed dwellings, with the plans. First he runs over the most economical houses, those for six hundred, twelve hundred or two thousand dollars. He studies the plans carefully, makes himself familiar with the details, the forms and the appearances, which the photographic plates readily enable him to do. The good wife, the daughters and the sons, all do the same, and in the course of their searchings and studies they find their attention almost insensibly directed toward the better class of houses, of which plans and photographs are also given. And on studying these better houses, they are found to be so much more comfortable, roomy, and in every way superior that the notion of a "cheap as possible house" has vanished, and the more sensible conclusion is decided upon that "We will have the very best house our means will permit." Hundreds

therefore ask you to do all you can for us. Remember, the more subscribers we have, the more we can beautify and improve our publication, and thereby increase your advantages.

**American Stone Fields.**

The development of American stone interests is wonderful, and their possibilities are even more so in view of the enormous extent and general distribution of the stone fields. The labors of Dr. John C. Branner, State geologist for Arkansas, have disclosed the existence in that State of large bodies of limestone, sandstone, and marble, and shown their availability for building and other purposes, while Wyoming and Colorado are developing every imaginable variety of stone in enormous quantity. Indeed, the entire Rocky Mountain system contains every variety in endless amount. The Mullan pass, but a few miles from Helena, Montana, is through a mountain of marble of the purest whiteness, and in the Yellowstone district the formation is for many miles a solid concretion of variegated marbles. From its very profusion only small portions are likely ever to be developed, and costs of long transportation and lack of facilities will tend to confine their use to immediate localities.

Limestone of the best quality for the manufacture of good lime is common throughout the greater part of the State lying north of the Boston Mountains. Some poor limestones have been used in that region for the production of lime, but this has been due rather to a lack of knowledge of the best limestones than to the lack of the rocks. With the exception of a small area in the southwestern part of Arkansas, the soils of the State south of the Boston Mountains and east of the Black River are all more or less deficient in lime. If there were railway facilities through the region in question, it is reasonable to suppose that a demand would be created for lime for agricultural purposes as well as for use in buildings.

Marble exists in great quantities skirting the hills and mountains in outcrops hundreds of miles in length, traversing Independence, Stone, Izard, Searcy, Marion, Boone, Newton, Madison, and Carroll Counties, and probably extending into Benton and Baxter Counties. This marble is of two varieties, a light gray and pink or flesh-colored variety, which is also occasionally mottled. It occurs in almost unbroken beds across the region mentioned, the outcrop winding in and out about the hills and valleys. These marbles vary greatly in those qualities which render marble valuable in the market.



A RESIDENCE AT MT. VERNON, N. Y.—[See page 22.]

of architects and builders in all parts of the country can testify to this educative influence of our paper upon their customers. Many builders know by experience that by this means jobs which at first promised only fifteen hundred dollars have been raised to four or five thousand dollars.

It makes a heap of difference to an architect or a builder whether he is employed on a wretched little cheap house or on a good, substantial one. Manifestly then it is to their interest, as well as that of their customers, to have the **SCIENTIFIC AMERICAN** widely circulated, and its photographic pictures and plans brought everywhere to public notice. Every architect and every builder can do something to aid this good work. Talk about it to friends and customers. Get them to subscribe. It costs only \$2.50 a year. It is the cheapest, finest, and most useful architectural work ever produced. Every number is intrinsically worth more than the price of the year's subscription. Where can a builder find in one number a dozen plans of attractive new houses, with splendid plates in colors, for \$2.50? They are not to be had except in the **SCIENTIFIC AMERICAN**, and for the money stated, instead of one number, we give a year's subscription. We say specially to architects and builders, you were never before supplied with a paper that did you so much good, that tended so much to help you to business and to profitable contracts as the **SCIENTIFIC AMERICAN**. We

From the Rockies eastward by the Lake Superior region and on over parts of Canada to Nova Scotia, and which includes the well known quarries of New York, Vermont, and Maine, are enormous possibilities. And then southward along the Appalachian system are all the varieties of stone in great quantity extending far into Georgia. In the intermediate regions are the oolites and sedimentary rocks of later formation. In truth there is no considerable section of the United States deficient in good rock, and in such profusion as to make it certain that the use of stone for building, road and bridge making is hardly begun, and that it is certain to be the material of the future. Dr. Branner in his report mentions a saccharine sandstone, in many places clear of impurities and beautifully white, exposed along outcrops hundreds of miles in length from Lawrence and Independence Counties on the east to Carroll and possibly Benton County on the west. In other parts of the country, notably at Crystal City, Missouri, this same stone is utilized for the manufacture of plate glass, and is shipped thence to other parts of the United States for similar purposes. This deposit in Arkansas is available for the same uses.

Many of the sandstones of northern Arkansas are well adapted to architectural purposes. The Batesville sandstone, so much used at that place, which has been shipped to St. Louis, crops out across the State from Independence County to Carroll County.

At a great many points, indeed at most of them, the rock contains in its bedding small patches of earthy shale. These spots render the marble fissile at the points where they occur, and at the same time mar the beauty of the stone somewhat for ornamental purposes. Where the beds are massive, however, these blotches will not injure the stone for general architectural purposes, while its color is calculated to make it a very attractive one for such work, and especially for the trimming of brick and stone buildings. This pink marble varies considerably in texture, color, and massiveness. In some places it is very fossiliferous, and takes a beautiful polish, while in some parts of the region it forms massive cliffs more than a hundred feet in height.

In the western part of the region this rock is rather compact and tough for ornamental purposes.

**How Can Iron Pulleys be Papered?**

First cleanse the pulley from grease with sal soda (washing soda). Then scratch the whole surface with a file. Wet with dilute nitric acid for a few minutes to deaden the scratches, clean with water, and dry. Apply the paper by winding, using the strongest glue, or the paper may be wetted with tannic acid and then applied as above. Some prefer to add a tablespoonful of glycerine to a quart of glue and then apply hot. Turn off the edges and apply a coating of common shellac.





#### A CARRIAGE HOUSE.

We illustrate on this page a carriage house erected for Mr. C. S. Osborne, at South Orange, N. J., from plans by H. Hudson Holly, Esq., architect, New York. Dimensions: Width 29 ft., depth 40 ft. Foundation and first story are built of field stone laid at random. Second story shingled and painted English red. Roof shingled and painted Indian red. Carriage room, 20 ft. by 26 ft., is provided with carriage wash, harness closet, stairs to second floor, etc. Stable contains three stalls and box stall, fitted up with iron furnishings. These apartments are ceiled with white pine. Under stable there is a cow pen and store room provided. Second floor contains a living room, two bed rooms and a storage room for hay, feed, etc. The living apartments are trimmed with white pine. Cost \$2,700 complete.

Our engraving was made direct from a photograph taken specially for the SCIENTIFIC AMERICAN.

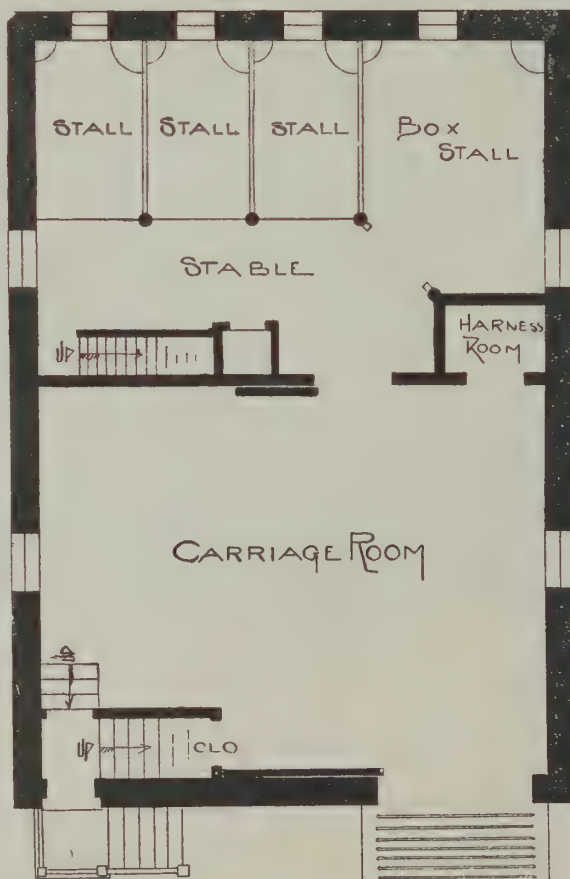
#### A RESIDENCE AT SOUTH ORANGE.

We illustrate on page 25 a residence erected for Mr. C. S. Osborne, at South Orange, N. J. Mr. H. Hudson Holly, New York, architect. Dimensions: Front, 41 feet 6 inches; side, 47 feet 6 inches, not including porch. Height of ceilings: Cellar, 7 feet 6 inches; first story, 10 feet; second, 9 feet; attic, 8. Underpinning and first story field stone; jambs to doors and windows Tiffany brick. Second story and gables shingled and painted English red, with bottle green trimmings. The plans show plenty of large rooms conveniently arranged, trimmed with white pine, natural finish. Floors of oak, laid in narrow widths. Sliding doors connect the principal rooms on first floor. Fireplaces of brick, have tiled hearths and antique oak mantels. There is a toilet room under front stairs, with bowl and closet complete. Kitchen and pantries are wainscoted and fitted up with all the conveniences. There are three bed rooms, library and bath room on second floor; each room is provided with ample closets; bath room wainscoted and provided with everything complete. Three rooms in attic. Cemented cellar contains laundry and furnace. Cost \$11,000 complete.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### England's Favorite Hardwoods.

Owing to the fact of the extended commerce of Great Britain, and that her trade relations bring her into intimate connection with every nook and corner of the uncivilized as well as the civilized world, the varied products of every clime are familiar in all her great marts. This fact is quite as true of the department of forest products as any other, and many woods are quite familiar to cabinet makers and other woodworkers of Great Britain which are almost unknown in this country. The list of hardwoods embraces the



partridge, the zebra wood, the mola, snake wood, the cocus wood, the teak, the jara, and many others, whose names even are unfamiliar in this country.

Notwithstanding this fact, however, that the list of woods used is much larger there than here, the principal varieties, furnishing the great bulk of the consumption of Great Britain, are there, as here, but few. First among them comes the oak, and following in the order named are ash, elm, alder, box, basswood, mahogany, teak and greenheart. Of all these woods, in value and variety of uses comes first the oak. It is used by the cabinet maker for his work, its beauty of grain and enduring qualities recommending it highly for this purpose. No timber can stand as many changes as this, and it is extensively used in railway work, such as frame work for passenger and freight cars; it is used in the country for carts and wagons;

for the frames and spokes of wheels; for all classes of agricultural implements; and is regarded with high favor by the building trades.

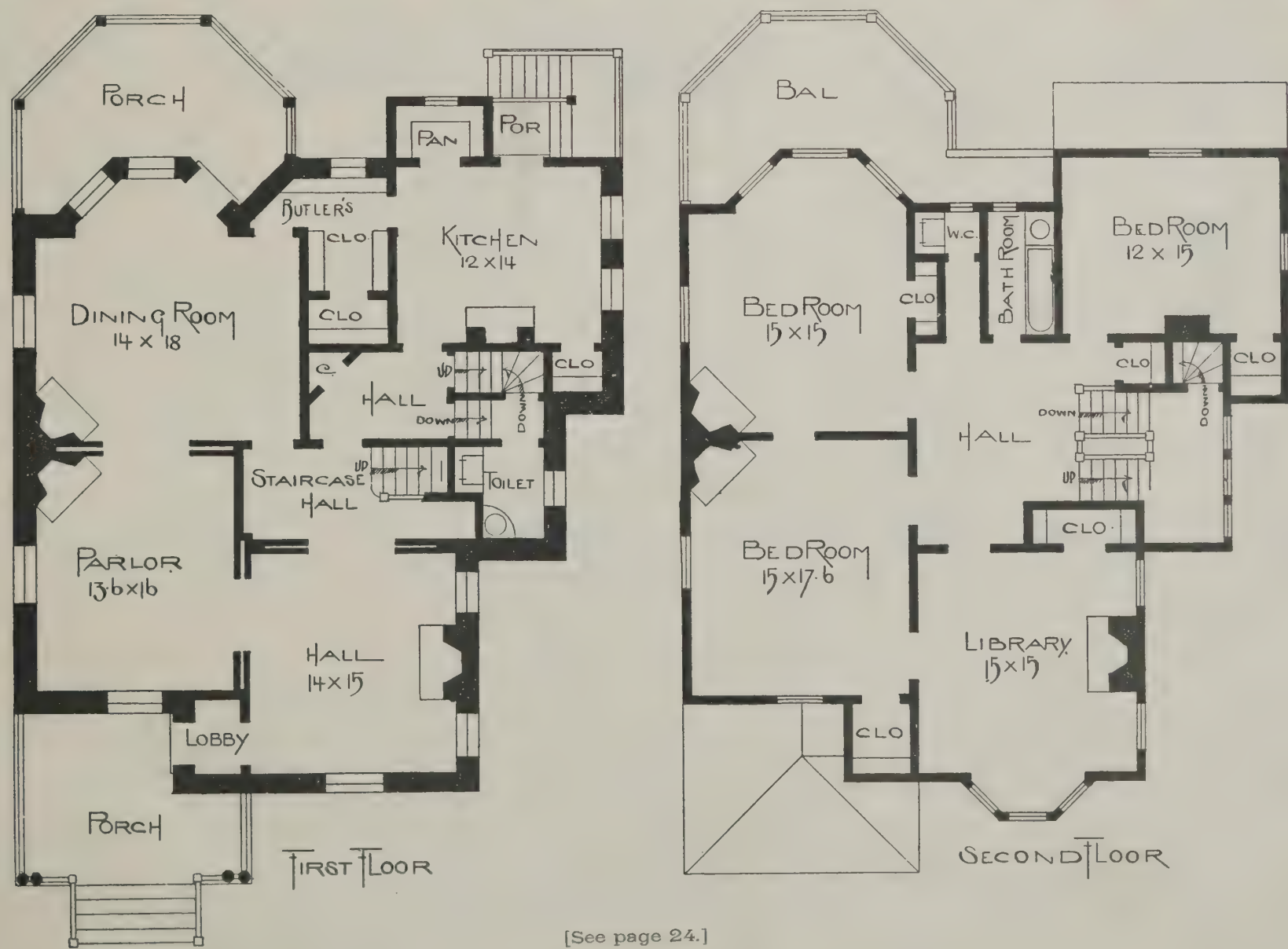
The tough and elastic ash is also in great demand by our English cousins. The cabinet maker and the ship joiner use it extensively, as it makes splendid fittings and takes a good polish. Manufacturers of street cars and carriage makers also buy large quantities of it. American ash is highly esteemed, but the Hungarian ash, with its rich and beautiful figure, has the preference for ornamental purposes. Elm is much used for a variety of purposes, but it is preferred for indoor work, as it will not stand the weather, the alternate wet and dry soon rotting it. Teak is a valuable timber, somewhat resembling oak, coming from India and Burma, and is sometimes called Indian oak. It is very heavy, and is highly esteemed for ship work, such as deck houses, sash, sky lights, combings for companion ways, etc. Some of the better qualities of this wood resemble rosewood, and it has a very strong smell, preventing insects from attacking it. Sycamore, which in this country is coming to be valued highly by furniture makers and for interior finish, by reason of the beautiful polish of which it is susceptible, is used in England chiefly by the coach builder, but will, in the course of time, become a favorite with cabinet makers when they come to understand its true value.

The treatment of woods, particularly furniture woods, in finishing them, is somewhat different from that in use in this country. The English woods are finished in dark colors mostly. They do not do much with light woods, like birch or maple, but when once the British public comes to understand the exceeding beauty of these woods when manufactured into furniture, they will without doubt quickly become popular. A movement is now on foot by furniture manufacturers of Grand Rapids, for establishing a distributing center for their goods in some large city of Great Britain, probably Glasgow; and notwithstanding the well known conservatism of the English people, it is thought that these products will meet with ready sale, for sound sense and ability to recognize a good thing when they see it is quite as prominent a British characteristic as is their proverbial conservatism.—*The Timberman*.

#### Plans and Specifications.

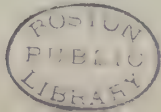
Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.





[See page 24.]

A RESIDENCE AT SOUTH ORANGE.





## A RESIDENCE AT GERMANTOWN.

We present on page 27 a residence, Gothic in treatment, erected for B. P. Wilson, Esq., at Germantown, Pa., from plans prepared by Frank G. Cauffman, architect, Lower Roxborough, Philadelphia, Pa. Dimensions: Front 61; side 67', exclusive of piazza and *porte-cochere*. Height of ceilings: Cellar 8'; first story 11'; second 10'; third 9'. The exterior walls are built of "quarry faced" Chestnut Hill stone, with stone cornice and bluestone corbels; roof covered with Vermont red slate. Main hall 24' x 24' and 22' high is treated in the Gothic style and finished in quartered

ures, painted in tapestry effect. Both halls are wainscoted. The spandrels to staircase are formed with Gothic tracery work, backed by tapestry. Drawing room is finished in the "Moresque" style, decorated in cream, light blue and gold. Library finished in quartered oak, with wainscot and ribbed ceiling. Book cases, lounge and seats are built in. Mantel of stone, with cabinet over mantel in oak. Dining room is finished in quartered oak, and is a mixture of Gothic and Renaissance styles. It is wainscoted eight feet high, and the ceiling is ribbed with oak in geometrical figures. Buffet and china closets are built in. The man-

by steam and lighted by electric incandescent system, and is furnished with electric bells, burglar alarms, and hose attachment on each floor, also lift from cellar to third floor. Our engraving was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

## Floors.

Why one finds so few good floors, when architects never fail to make the proper specifications to obtain such, is somewhat of a mystery to every one who suffers from bad floors, and this every one includes the man or woman who sweeps the floors, those who suffer from the dirt and dust they harbor, and especially those who carry off slivers in the soles of their shoes.

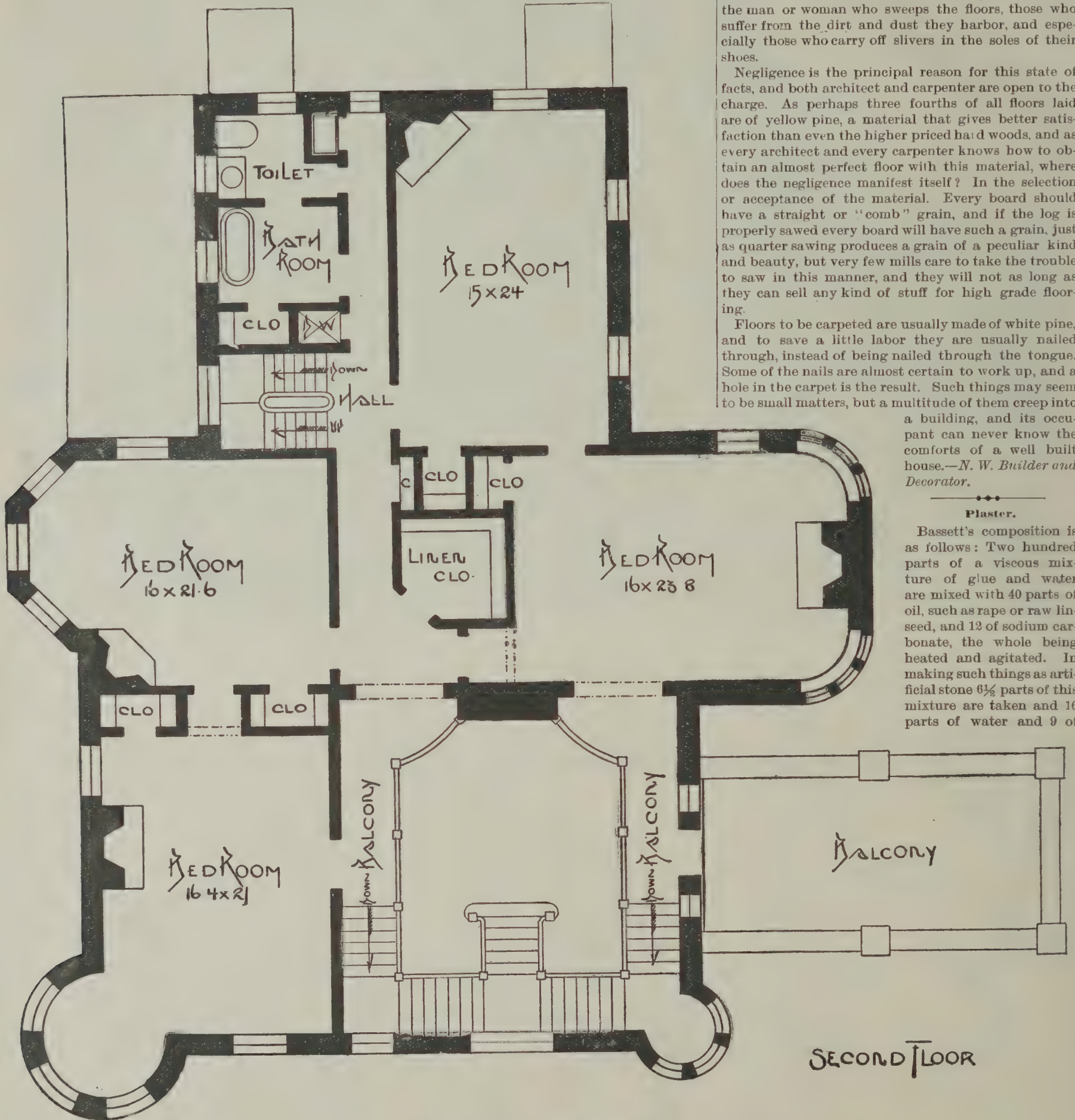
Negligence is the principal reason for this state of facts, and both architect and carpenter are open to the charge. As perhaps three fourths of all floors laid are of yellow pine, a material that gives better satisfaction than even the higher priced hard woods, and as every architect and every carpenter knows how to obtain an almost perfect floor with this material, where does the negligence manifest itself? In the selection or acceptance of the material. Every board should have a straight or "comb" grain, and if the log is properly sawed every board will have such a grain, just as quarter sawing produces a grain of a peculiar kind and beauty, but very few mills care to take the trouble to saw in this manner, and they will not as long as they can sell any kind of stuff for high grade flooring.

Floors to be carpeted are usually made of white pine, and to save a little labor they are usually nailed through, instead of being nailed through the tongue. Some of the nails are almost certain to work up, and a hole in the carpet is the result. Such things may seem to be small matters, but a multitude of them creep into

a building, and its occupant can never know the comforts of a well built house.—N. W. Builder and Decorator.

## Plaster.

Bassett's composition is as follows: Two hundred parts of a viscous mixture of glue and water are mixed with 40 parts of oil, such as rape or raw linseed, and 12 of sodium carbonate, the whole being heated and agitated. In making such things as artificial stone  $6\frac{1}{2}$  parts of this mixture are taken and 16 parts of water and 9 of



A RESIDENCE AT GERMANTOWN, PA.

oak. The ceiling of oak is heavily beamed and ribbed, forming deep panels. After one short run the staircase divides, and extends around two sides of hall, forming balconies, the posts of which extend to ceiling. Between these posts are carved brackets, forming Gothic arches, from the center of which are suspended wrought iron lamps, of antique pattern. The balconies are returned by a curve at end of hall to breast of a large stone mantel. This mantel is eight feet wide and eighteen feet high, and is made of English red sandstone, richly carved. In one of the upper panels five large jewels (same color as stone) are inserted in the carving, and these can be illuminated by an electric light placed behind. At first landing of stairway there is a large Gothic window of stained glass, on either side of which are life size heraldic fig-

ures, painted in tapestry effect. Both halls are wainscoted. The spandrels to staircase are formed with Gothic tracery work, backed by tapestry. Drawing room is finished in the "Moresque" style, decorated in cream, light blue and gold. Library finished in quartered oak, with wainscot and ribbed ceiling. Book cases, lounge and seats are built in. Mantel of stone, with cabinet over mantel in oak. Dining room is finished in quartered oak, and is a mixture of Gothic and Renaissance styles. It is wainscoted eight feet high, and the ceiling is ribbed with oak in geometrical figures. Buffet and china closets are built in. The man-

tel has caryatides, carved in oak, supporting shelf, above which is a richly carved over-mantel, in the center of which is a painted stained glass window of Pomono. All the painted decoration of walls and ceilings on first floor is done on canvas in tapestry effects. Spandrels of Gothic arches in hall, and panel in frieze of dining room, have moulded relief work. Second floor is finished in oak, chestnut and quartered sycamore. Bath and toilet rooms are floored and wainscoted with tile. The bath tub is cut from a solid block of white marble, with grotesque heads carved on sides, and was made in Italy fifty years ago. Third floor is finished in chestnut and white pine, natural finish, and contains four bed rooms, billiard room, bath room, and dark room. All floors are double, upper floor of first story being of oak. House is heated

borax added thereto. One part of the resulting mixture is added to 6 parts of water, 1 part of white china clay, and enough plaster of Paris to give a stiff paste which can be moulded and polished. For the preparation of plaster for walls, etc.,  $6\frac{1}{2}$  parts are added to 16 of water, 96 of plaster of Paris, and 1 part of air-slaked lime, the mass dried and mixed with 9 parts of powdered borax; one part of the dried mass is mixed with  $14\frac{1}{2}$  parts of plaster of Paris, 40 parts of building sand,  $1\frac{1}{2}$  parts of wood dust and enough water to form a paste, which is applied as a first coat. The material for the second coat is made by using 10 of the dried composition, 112 of plaster of Paris, 140 of fine sharp sand, 10 of white china clay or powdered Bath stone, and enough water to form a fairly stiff paste. Similar compositions for other purposes may be used.



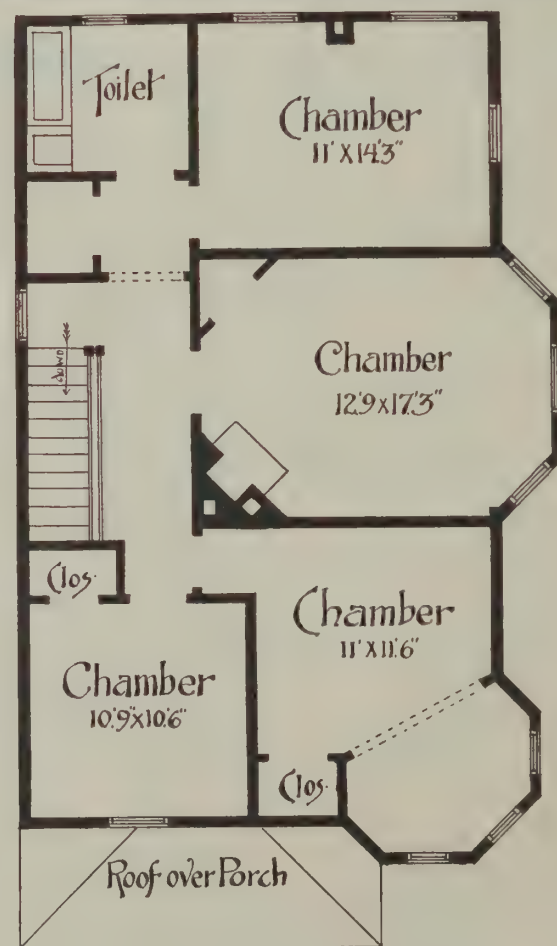
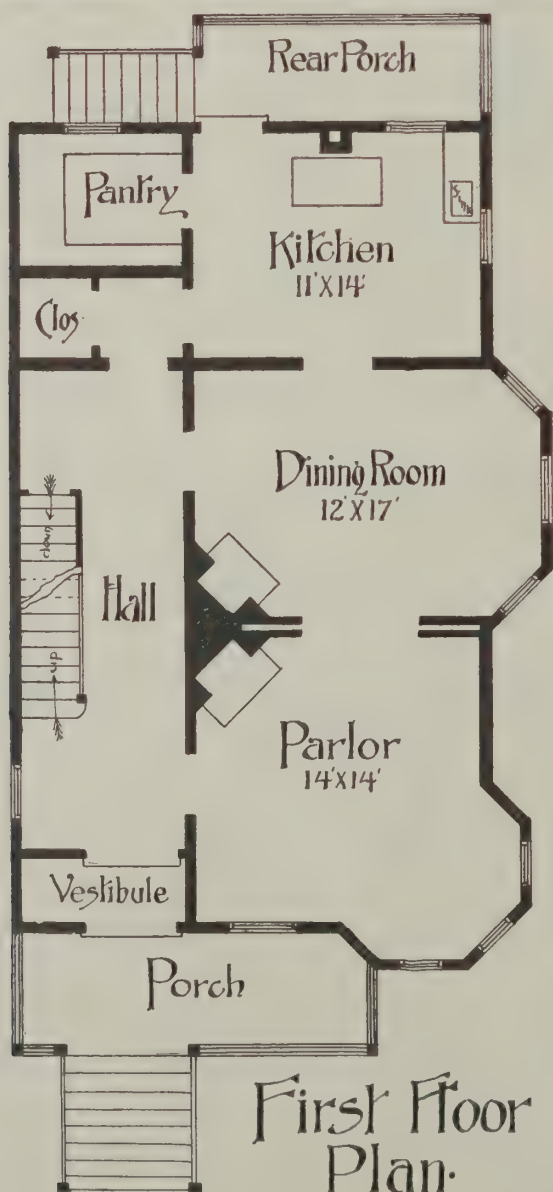


[See page 26.]

A RESIDENCE AT GERMANTOWN, PA.





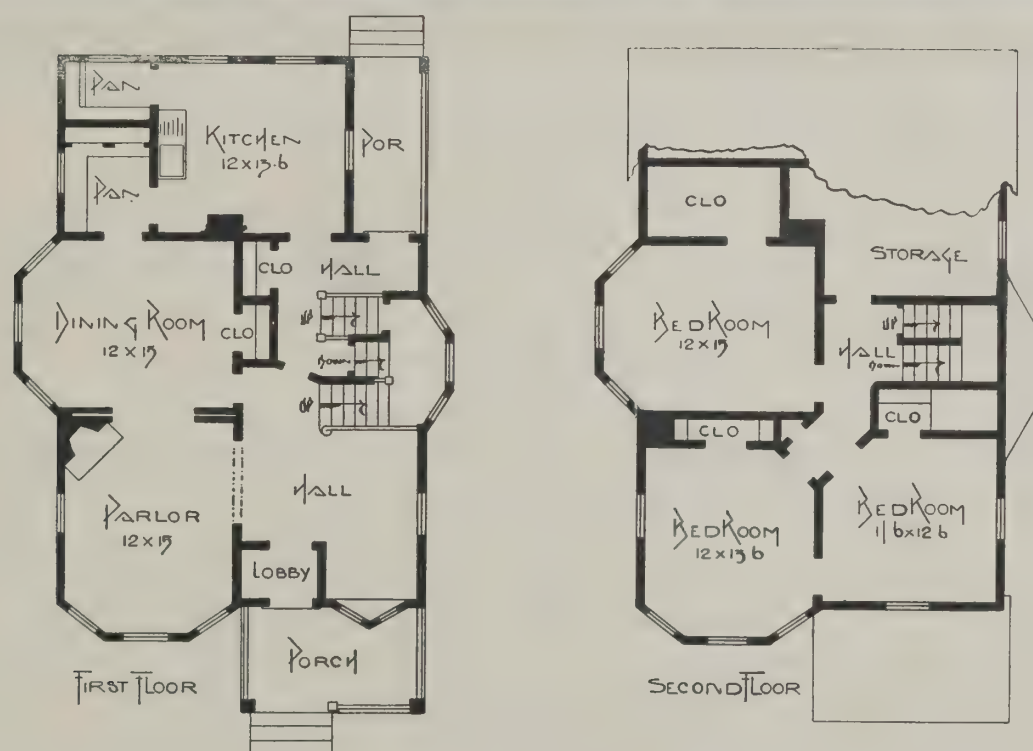


[See page 29.]

A COTTAGE, SOPHIA AVENUE, CHICAGO.







A COTTAGE AT STRATFORD, CONN.

## A COTTAGE AT STRATFORD, CONN.

We illustrate on this page a cottage recently erected by Mr. Frank Sammis, at Stratford, Connecticut. Dimensions: Width, 31 feet; depth, 41 feet 6 inches, exclusive of porch. Height of first story, 9 feet; second, 8 feet. Underpinning built of field stone, laid at random; chimneys are topped out with similar stone. Exterior frame work is sheathed, and then covered with shingles, left to weather finish. The floor plans are all that could be desired, the rooms being of good size and conveniently arranged. The trim throughout the interior is of whitewood, stained and finished in cherry. A novel feature has been produced by joining the back and main stairways, the latter having newels, balusters and rail of natural cherry. Upper sashes to windows on first landing are glazed with cathedral glass. Parlor has an open fireplace, built of brick, with slate hearth and mantel with mirror. Kitchen and pantries are trimmed and wainscoted with North Carolina pine, finished natural with hard oil, and fitted up complete. Second floor contains three bed

rooms, with large closets and storage. Open attic could be finished off if desired. Cellar contains furnace. Cost \$2,700 complete. Our engraving was reproduced direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## A COTTAGE ON SOPHIA AVENUE, CHICAGO.

We publish in this issue, on page 28, two floor plans and a photographic view, taken specially for the SCIENTIFIC AMERICAN, of Mr. John Goodwill's cottage, which is situated on Sophia Avenue, corner of Franklin Avenue, Chicago.

The veranda extends half way across the front, and the main hall is entered through a vestibule. The parlor is entered from the hall and is lighted by large octagonal window and heated from angle fireplace. It measures 14 ft. by 14 ft., and communicates with the dining room by sliding doors. The dining room has angle fireplace and large bay window, measures 12 ft. by 17 ft., and has direct entrances to hall and kitchen.

The kitchen, situated at the rear of the dining room, measures 11 ft. by 14 ft. and contains range and all modern conveniences, with pantry leading off it. It communicates with the hall through a vestibule and opens direct on to the dining room and rear porch. On the second story are four chambers, with convenient closet room, also toilet room, with all conveniences. The principal chamber has pleasant alcove window. There is good attic accommodation. The house is pleasantly situated and nicely sheltered, and is of frame construction throughout, with good cellars. The cost is estimated at \$2,800.

CALIFORNIA wine growers have tried the plan of boiling fresh grape juice to the consistency of honey, and exporting it in cans, like fruit sirup. Chemically, the project had a fair chance of success, but was wrecked by the enormous duties of the European custom houses. France grape sirup shipped to the African colony of Massana was there mixed with water and fermented into a very popular variety of wine.



## A COLONIAL RESIDENCE.

We present on page 31 a residence, colonial in treatment, erected for B. B. Schnieder, at South Orange, N. J. Dimensions: Front 61' 6", side 47' 4", exclusive of porch. Height of ceilings: cellar 8', first story 10', second 9', third 8'. First story built of dark red sandstone, "rock-faced" and laid at random; second and third stories are clapboarded and painted colonial yellow, with white trimmings. Blinds painted bottle green, roof shingled, painted red. Hall trimmed with antique oak, has ceiling beams and a paneled wainscoting. The carved posts to staircase run to ceiling, and between these posts are carved brackets, forming Moorish arches. Parlor trimmed with cherry, library with sycamore, and dining room with antique oak. Dining room finished in old colonial style, has ribbed ceiling of oak, sloping from center to either side, with quaint effect. Buffet built in, has china closets on either side with doors, glazed with beveled plate glass. Nook contains a large open fireplace, with seats, etc. Fireplaces throughout have tiled hearths, Mexican onyx facings and hard wood mantels of exquisite design. Floors of oak. Kitchen and pantries are wain-

## Developments of Construction.

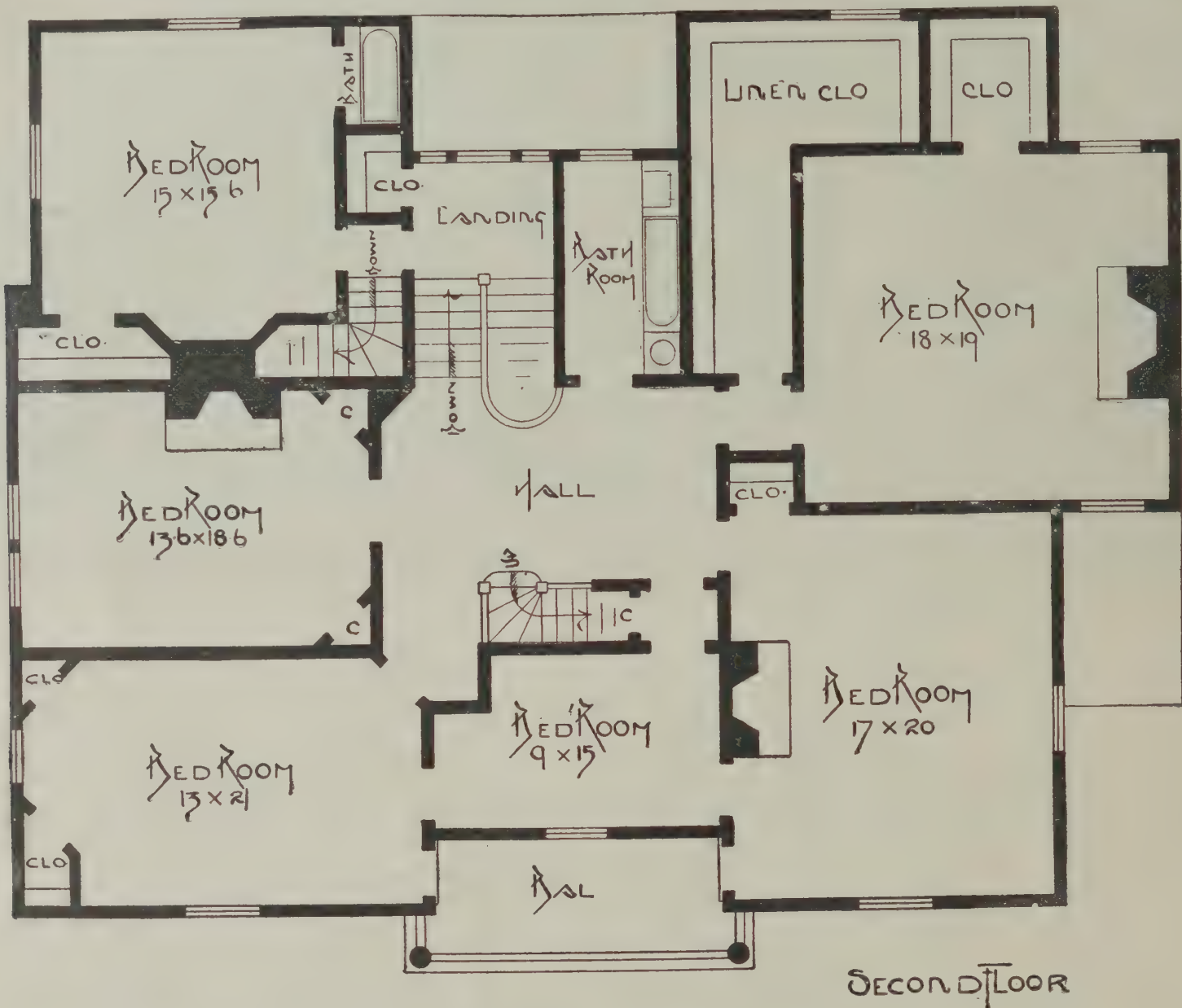
Materials about which little was known a few years ago have considerably affected the design of details. Two of them are worth notice—concrete and asbestos. The former by itself or in connection with iron has materially extended construction in nearly every branch, and has called for a special knowledge of both. Considerable ingenuity has been called for, as the numberless patented and other improvements in floors, roofs, staircases, and details testify. These materials have created quite a new treatment or idea, unlike anything in timber, stone, or other material, and we have yet far from reached the possible combinations of concrete and iron.

Another material—a mineral—has of late forced its way into notice by the valuable properties it possesses as a useful boiler and pipe packing, as a valuable fire-resisting material, and as a non-conductor of heat and sound. The fine and tenacious fibers of Italian and Canadian asbestos are now applied to a large variety of uses, not only as a packing for boilers and pipes, but for structural purposes as a non-transmitter of heat and sound, and therefore valuable for partitions, floor and

and plastering of silicate cotton and plaster are also largely employed in the States; so before long we may anticipate that, by improvement of manufacture, the material will enter more largely than it now does into the construction of walls, floors, and roofs, and that it may even become a substitute for woodwork to some extent. These are only a few instances of how competing forms, structures, and materials are, by a process of extinction and survival of the fittest, making a new development of architecture possible.—*Building News.*

## Etching upon Glass.

Meth & Kreitzer's solution is prepared by mixing together in proper proportions ammonium fluoride, sodium chloride and sodium carbonate, and then placing the mixture in a gutta serena bottle containing fuming hydrofluoric acid and concentrated sulphuric acid. In a separate vessel made of lead, potassium fluoride is mixed with hydrochloric acid, and a little of this solution is added to the former, along with a small quantity of sodium silicate and ammonia. Some of the solution is dropped upon a rubber pad, and by means of a suitable rubber stamp bearing the design to be repro-



A COLONIAL RESIDENCE.

scoted and trimmed with ash and are replete in all their appointments. Second floor contains five bedrooms and bath, besides servants' bed room and bath, with private stairway to kitchen. Bath room is paved and wainscoted with white English tiling and fitted up complete in the best manner. There are two bedrooms and trunk room on third floor, trimmed with various kinds of woods. Cemented cellar under whole of house contains laundry, furnace, and other apartments. Cost \$17,000 complete. Rositter & Wright, architects, New York City. Our engraving was reproduced direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## Corrosion of Zinc in Contact with Brick.

Under some conditions, sheet zinc, when in direct contact with brickwork, appears to suffer to an appreciable extent from rapid corrosion. It has been found in the Berlin city market halls that a portion of the zinc work supported upon brick walls was deeply pitted at a number of places, this being particularly the case where the metal was close to the bricks. Chemical examination of the bricks showed that they contained as much as 1.14 per cent. of soluble salts, capable of producing the destructive effect in question, and stimulated to more energetic action by moisture. The proportion of such salts, of course, varies with different kinds of bricks, while in some there may be nothing to induce any such corrosion.

roof construction. This property of asbestos has been utilized in various ways. In New York and elsewhere buildings for cold storage of meat and provisions, with double walls having asbestos as a filling, are erected. As a covering, or as a paint, to render wood unflammable, the material is extensively used, and Bell's Aquol paint is not only a fire-resisting, non-conducting, impervious paint, but can be used for decorative painting, and is susceptible of very delicate treatment. We believe that, as a covering for woodwork, asbestos has a future which architects must recognize, and we shall probably see before long, moulded casings of the material for iron and wood columns, girders and floors. It possesses great tensile strength, and so can be employed in situations exposed to strains or shocks. It is capable of being used for composition mouldings and decoration, for stove pipes of moulded shape and of great lightness. As it can be woven or applied in moulded forms, it is adaptable to almost any architectural purpose.

For ceilings asbestos seems capable of a very extended application, as it can be moulded to represent panels and painted decoratively. As a woven fabric it is useful for walls. "Slag wool," or silicate cotton, is another material having many of the valuable properties of asbestos as a non-conductor of heat and cold and fire-resisting agent, extremely light, and a valuable deafener of sound. Floors, roofs, and walls are now fitted with slabs of this material. Wire netting

duced, is transferred to the glass vessel which is to be etched.

## Magnesia in Cement.

In a paper, "Magnesia in Portland Cement," by R. Dyckerhoff (*Chem. Zeit.*) the author, who has already pointed out the dangerous character of cements rich in magnesia, their tendency being to expand slowly after setting, careful measurements of their expansion giving also only doubtful indications unless at least half a year has elapsed since gauging, says he is disposed to fix the maximum permissible amount of magnesia in Portland cement at 4 per cent., and the Association of German Cement Manufacturers has formed a committee to report on the subject; such makers as are using dolomitic material being specially interested.

## PATENTS.

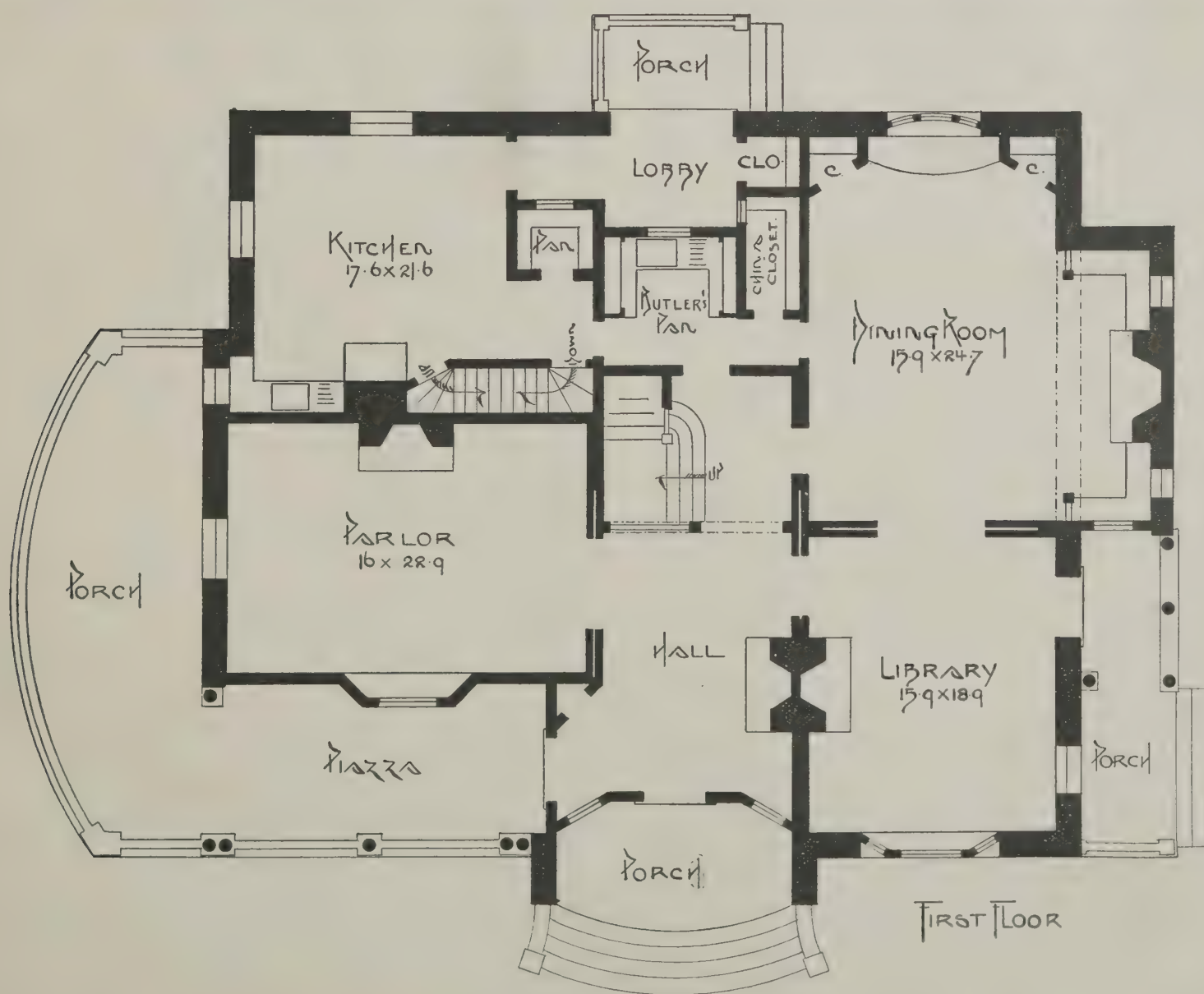
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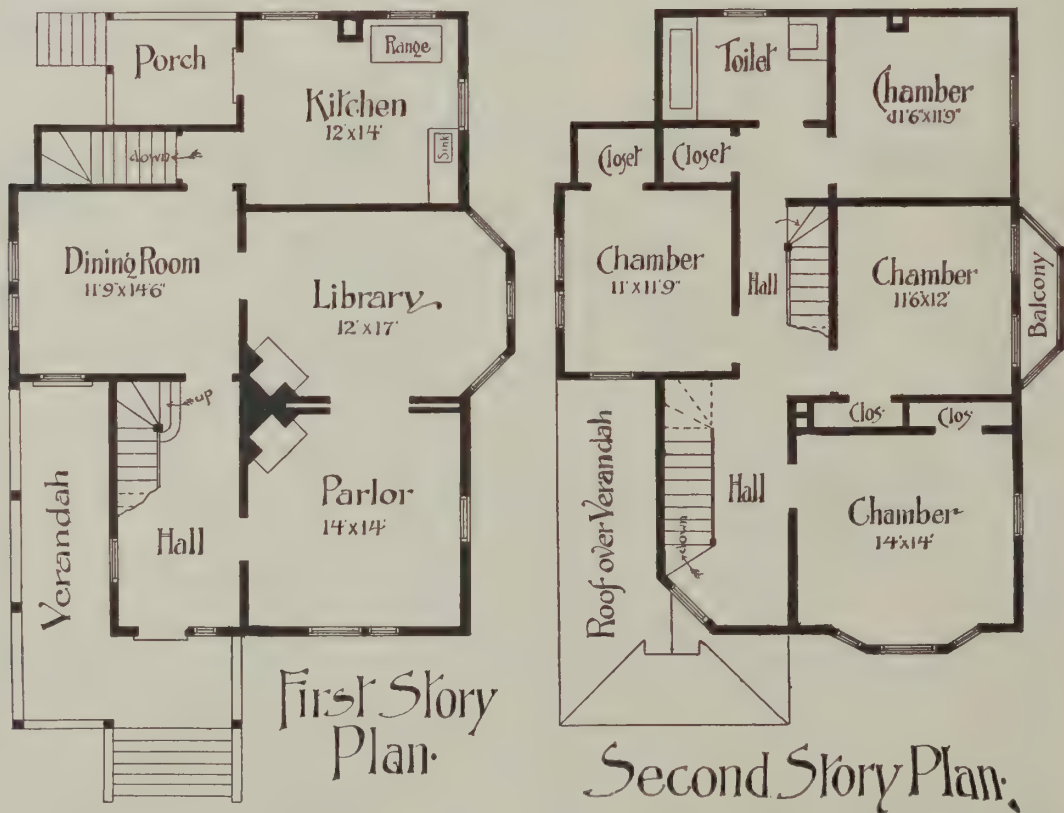




A COLONIAL RESIDENCE.—[See page 30.]







A COTTAGE, ELM STREET, AUSTIN.

Our Last Year's Volume.

If any of our readers desire to possess themselves of one of the finest collections of building plans ever presented to the public, we advise them to secure a bound collection of the numbers of our Building Edition for last year, 1890. We furnish the volume complete, bound in paper covers, for \$3.50, and in stiff covers for \$4.50. The volume is embellished with elegant plates, in colors, in addition to which is the entire series of photographic plates of the buildings we have illustrated during the past year, including the floor plans of the same. To builders, architects and all who are looking for the best examples and the best suggestions respecting dwellings, whether of high or low

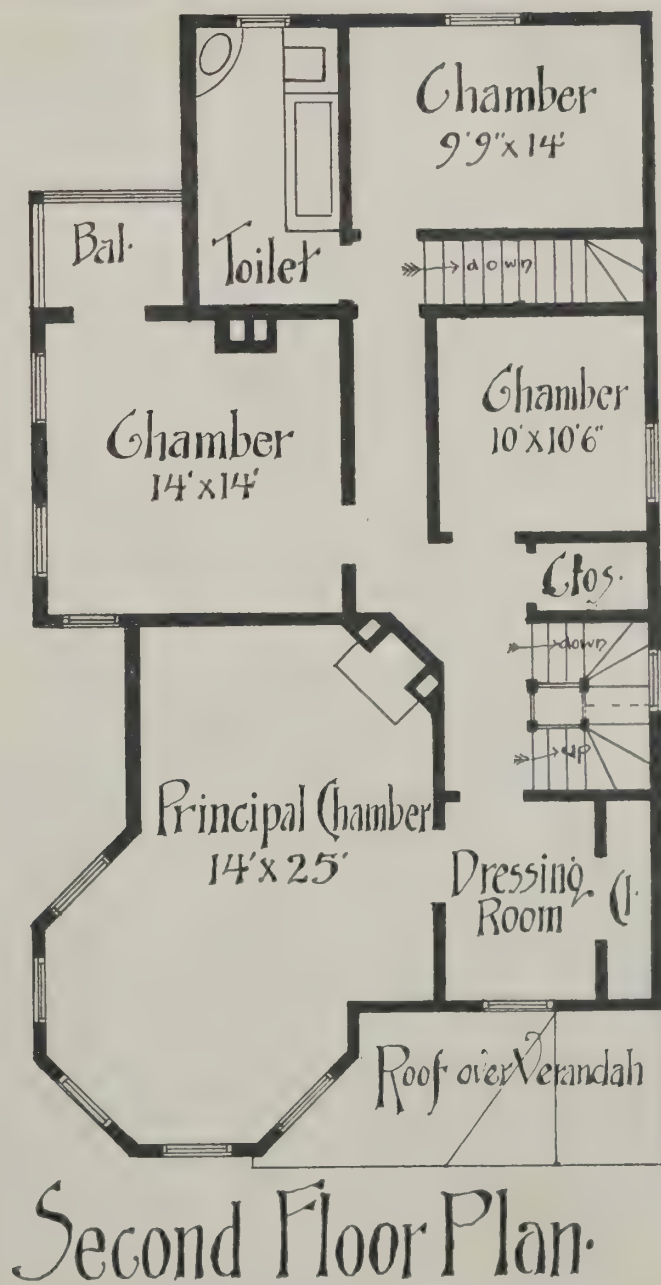
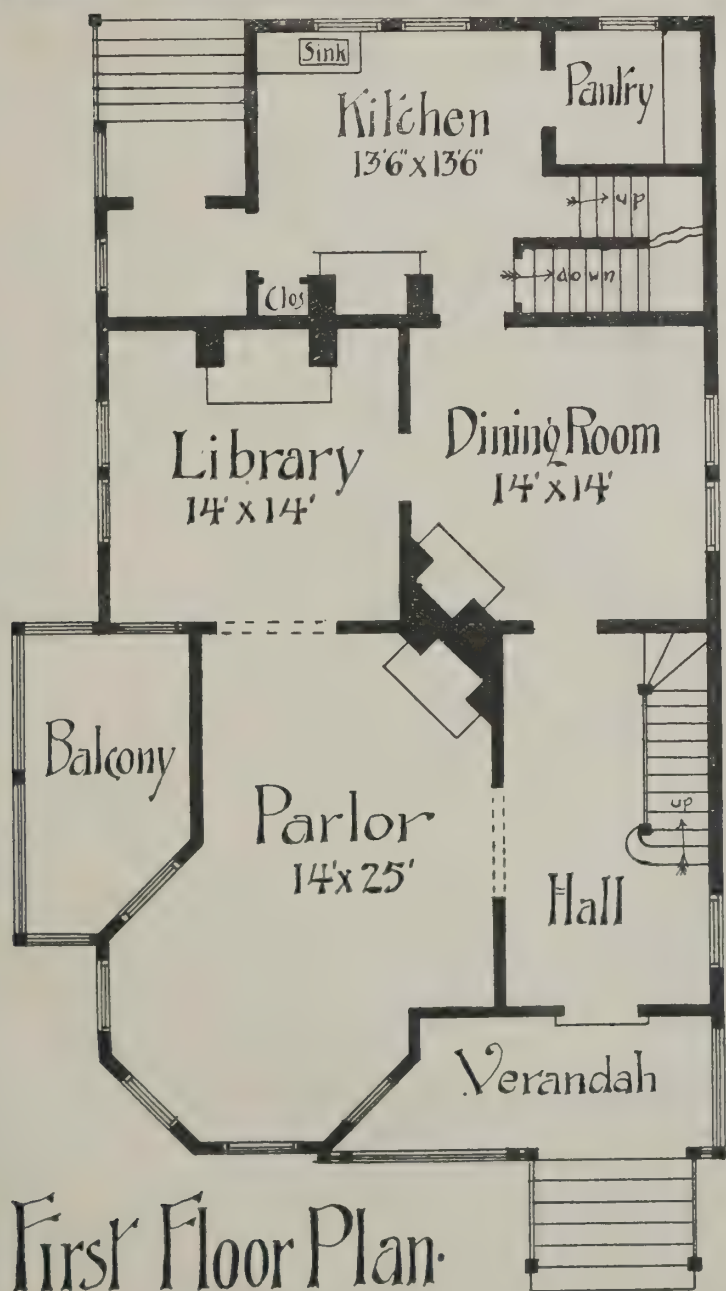
cost, this collection will be found most convenient and of permanent value.

A COTTAGE ON ELM STREET, AUSTIN, CHICAGO.

We publish this month, on this page, two floor plans and a photographic view of the above cottage, situated as above, built for Mr. R. H. Traill. The basement is of rock-faced stone and the first and second stories are frame, covered with clapboards prettily painted. There is a pleasant verandah extending round from the front half way along the south side. The parlor opens directly on to the hall, and is 14 ft. by 14 ft., with angle fireplace, and connects with library by sliding doors. The library is entered from the dining room as well as

from the parlor, has an angle fireplace and is lighted by a large bay window extending the whole width of the room. The dining room is 11 ft. 9 in. by 14 ft. 6 in., lighted by a mullioned window, and is entered from the hall direct or from the kitchen. The kitchen is 12 ft. by 14 ft., with range, sink, etc., and has direct communication with rear porch. The second story contains four bed chambers with convenient closet room, also toilet room, with bath, etc. There is also good attic accommodation. The house stands on its own lot and is pleasantly situated, and estimated to cost \$3,700. Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.



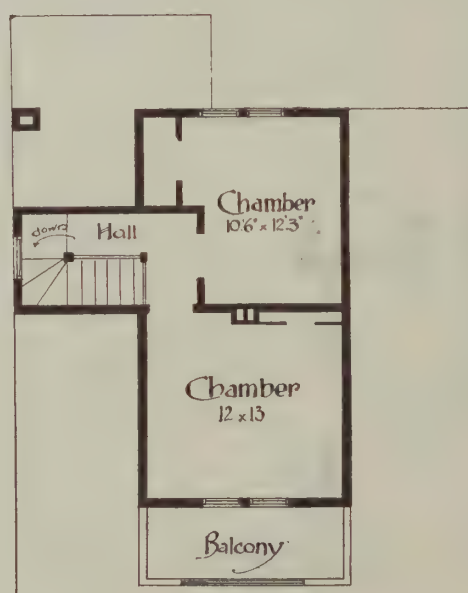
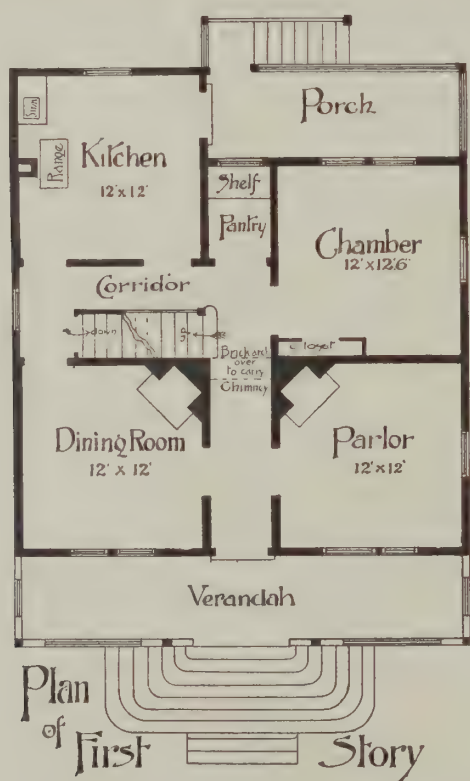


[See page 34.]

A COTTAGE, FAVORITE STREET, AUSTIN.







A COTTAGE OF MODERATE COST.

## A COTTAGE OF MODERATE COST.

We publish herewith, on this page, a photographic view, taken specially for the SCIENTIFIC AMERICAN, also two floor plans, of Mr. W. Beeson's cottage, which is situated on Elm Street and Prairie Avenue, Austin, Chicago, built of framework and covered with shingles throughout. A veranda extends across the whole front of the house, with three arches, and is surmounted by a small open balcony. There is also a large porch at the rear. The main entrance is in the center and opens on the right into the parlor, which measures 12 x 12 feet, has open angle fireplace, and has mullioned window in the front and single window on the side. The dining room opens off the other side of the hall, has mullioned window and angle fireplace. It has separate entrance to rear corridor and measures 12 x 12 feet. The kitchen opens off the corridor, measures 12 x 12 feet, and is fitted with range, sink, tubs, etc. It also opens on to the rear porch. A bed chamber is also

on this floor, 12 feet x 12 feet 6 inches, situated at the rear of the parlor, and the pantry is placed between this chamber and the kitchen. There are two chambers only on the second story, and there is good cellarage in the basement. The cottage is picturesquely situated, and is estimated to cost \$900.

## A COTTAGE ON FAVORITE STREET, AUSTIN, CHICAGO, ILLINOIS.

In this issue we publish, on page 33, two floor plans and a photographic view, taken specially for the SCIENTIFIC AMERICAN, of Mr. Geo. Chapin's elegant cottage, as above. It is surrounded by a large velvety lawn, shrubs, etc., and is some five or six miles from the center of the city. It is celled throughout and the basement story is built of stone. The first and second stories are frame covered with clapboards, and shingled roof. There is a veranda extending half

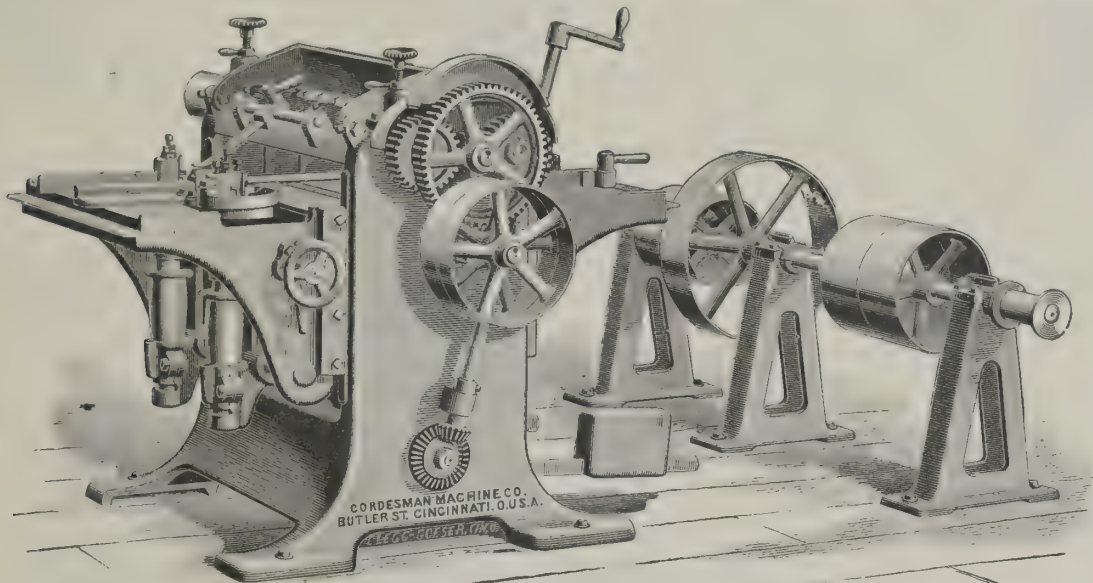
way across the front and a balcony on the side, both having pleasant views. The parlor is large, 14 ft. by 25 ft., with fine bay window, angle fireplace, and connects by portieres both with the hall direct and with the library.

The library is square, 14 ft. by 14 ft., has open fireplace and mullioned window, also window from which access is gained to the side balcony. This room is entered either from the parlor or dining room. The dining room is 14 ft. by 14 ft., has angle fireplace and mullioned window. It connects with the library and kitchen, also direct with the main hall. The kitchen is 13 ft. 6 in. by 13 ft. 6 in., has every convenience, roomy closet, pantry and rear porch. It connects with dining room. The second story has four chambers with closets, toilet room with bath, water closet, etc., and balcony with rear aspect. The principal chamber has also large dressing room. The estimated cost is \$5,000.



## IMPROVED WOODWORKING MACHINERY.

The new No. 1 planer and matcher shown in the illustration is especially designed to meet the requirements of job shops and small planing mills, where a variety of custom work is done and space and power are limited. It will surface, tongue, groove, and make flooring, beading, siding and various styles of flat mouldings. It is a very solid and compact machine, which may be driven at a high rate of speed without vibration, and is offered at a comparatively low cost. It is manufactured by the Cordesman Machine Co., 24 to 34 Butter Street, Cincinnati, O., who also make a



THE CORDESMAN MACHINE COMPANY'S PLANER AND MATCHER.

full line of machines for woodworking, for the excellence of which they have obtained a wide reputation.

## A Novel Calendar—Made of Tin.

The N. & G. Taylor Co., importers and dealers in tin plate, etc., of Philadelphia, have this year issued a calendar which, we believe, is entirely different from any ever before issued by any house. Apart from its being a yearly calendar, it represents a sheet of the Taylor "Old Style" brand of roofing tin, the sheet being designed to show the extra heavy coating of metal, the "mottle," and also the stamp in the corner. This is said to be the only brand of tin made that bears the name of a firm for the purpose of guaranteeing it.

METALLIC LATH is steadily growing in favor for use in the construction of fire-proof buildings. The lath made by the Cincinnati Corrugating Co., of Piqua, O., has received the recommendation of some of the most prominent builders and architects in the country. It retains the plaster readily, and is capable of sustaining greater weight than other forms of lathing without sagging. It reduces the liability of cracking of the walls to the minimum. Architects and builders, in making out their specifications, should not lose sight of the advantages afforded by the use of such permanently satisfactory materials.

## BROUGHTON SELF-CLOSING BASIN COCK.

The Broughton patent self-closing cock has been in the market for more than five years, and is in use in many of the leading hotels, giving excellent satisfaction. We illustrate the self-closing basin cock. It is strong, simple, and durable, and will not easily get out of order—made of the best metal, with spring of phosphor bronze metal. These goods are manufactured by the E. Stebbins Mfg. Co., Springfield, Mass., who make a large line of the best class of plumbers' brass goods. They issue an illustrated catalogue, which they will be pleased to forward to any address on application.

MATTING will always look bright if wiped off with a cloth dampened with salt water after sweeping.

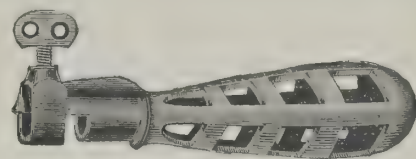
## The Edson Recording Pressure Gauge.

The fastest transatlantic steamships, such as the City of Paris, City of New York, Normannia, Russia, Friesland, Columbia, City of Berlin, etc., carry a boiler pressure of about 150 lb. per square inch, and, in order to maintain it without unnecessary variations, they have adopted the recording steam gauge of the Edson pattern, placing it in the chief engineer's room, the records from which are removed daily and placed in the album for the inspection of the shore engineer. These instruments are now included in the specifications of modern transatlantic ships; and it is a compliment to

buretor, which does not take up any extra floor space, as it is attached to the air pipe, and extends not more than six to eight inches from the cylinder off to one side. The tank supplying the gasoline is usually placed outside the building, and the carburetor is connected directly with it, but is under the complete control of the governor, so that it only makes the gas as it is called upon by the governor, and all the gas is consumed as it is made. By this simple yet positive arrangement, they overcome the liability of any escape of the gaseous mixture, and there is no smell, danger of fire or explosion, the gasoline supply being completely shut off. This engine is used for running printing presses, machine shops, elevators, elevating water for hotels, operating electric light plants, or any other use to which an engine can be put. In many instances parties have the gasoline attachment put on when they do not intend running with it continuously, but, should anything happen that they cannot get the gas, they can fill the gasoline tank and go right ahead, thereby preventing a delay that is in most cases very costly.

## UNIVERSAL FILE HANDLE.

The Millers Falls Co., 95 Reade Street, New York



UNIVERSAL FILE HANDLE.

City, have brought out the malleable iron file handle shown in the accompanying cut. The handle is five inches long, and the thumb screw is forged steel. It is durable and strong, and will hold all sizes of files perfectly, from the smallest size in use to a 15 inch mill file. It will hold equally well auger bits, gimlets, screw drivers, and twist drills, and all tools with shanks less than  $\frac{3}{8}$  of an inch square. This company issue an illustrated catalogue fully describing the goods they manufacture, which they will be pleased to forward to any address.

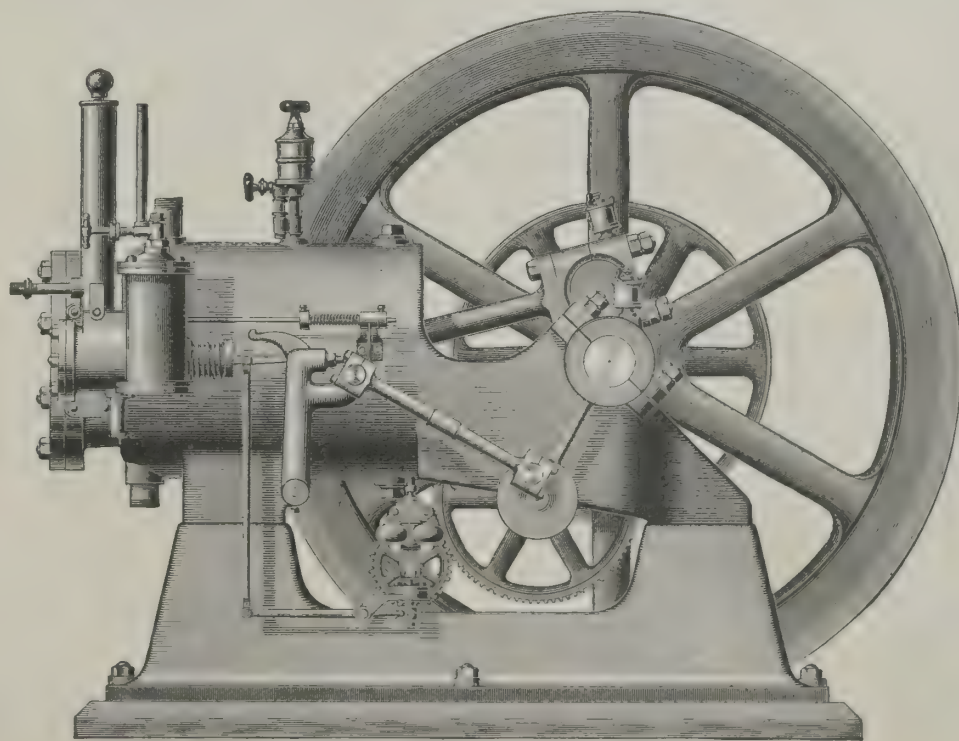
## The Dunning Hot Water Heater.

The New York Central Iron Works Co., of Geneva, N. Y., manufacturers of the Dunning Hot Water Heater, have issued a fine illustrated catalogue, describing with great plainness the construction and operation of this heater. Their business has been established more than forty years, and they claim to have more than fifteen thousand boilers now in actual use, warming all classes of buildings in all parts of the world.

IN connection with the publication of the BUILDING EDITION of the SCIENTIFIC AMERICAN, Messrs. Munn & Co. furnish plans and specifications for buildings of every kind, including Stores, Dwellings, Carriage Houses, Barns, etc. In this work they are assisted by able and experienced architects. Full plans, details, and specifications for the various buildings illustrated in this paper can be supplied. Those who contemplate building, or who wish to alter, improve, extend, or add to existing buildings, whether wings, porches, bay windows, or attic rooms, are invited to communicate with the undersigned. Our work extends to all parts of the country. Estimates, plans, and drawings promptly prepared. Terms moderate. Munn & Co., 361 Broadway, New York.

## A NEW GASOLINE ENGINE.

The Van Duzen Gas and Gasoline Engine Co., of Cincinnati, Ohio, has recently brought out a new gasoline engine, which is very compact and economical, the cost of running it being computed at about one cent per hour per horse power, on a basis of 10 cents per gallon for gasoline of 74 test. The engine is shown herewith, and is of the same construction as the gas engine made by the same company, with the addition of a car-



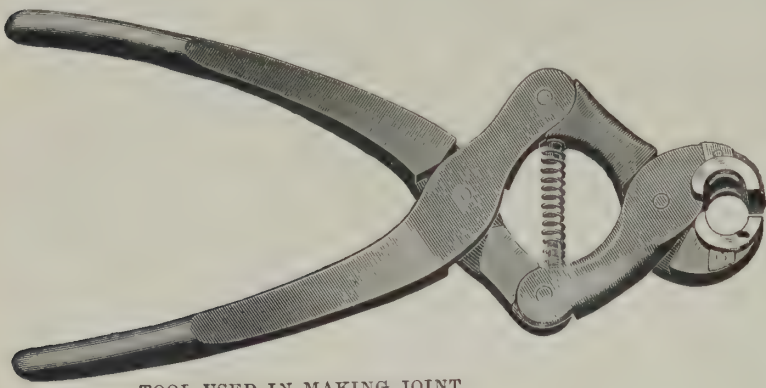
THE VAN DUZEN GASOLINE ENGINE.

BROUGHTON SELF-CLOSING BASIN COCK.



IMPROVED CONDUITS FOR ELECTRIC WIRES.

The Interior Conduit and Insulation Co., of Nos. 16 and 18 Broad Street, New York City, has devised and put into operation a system of taking care of electric wires which has met with great favor, and which is



TOOL USED IN MAKING JOINT.



SECTION OF COUPLING OR JOINT.

AN INTERIOR CONDUIT AND INSULATION SYSTEM.

adapted not only for all classes of electric light wiring, but for electric bell and annunciator wiring as well. The company, in striving to simplify the construction and cheapen the cost of their goods, has adopted a new coupling or joint, which we illustrate herewith. The new joint will supplant and entirely dispense with the use of the threading tool, threaded coupling and cementing compound. The sleeve is made of soft galvanized iron, and being of a slightly larger diameter than the tube itself, fits snugly upon it. The tool, which is made in the form of a pair of pliers, serves to press the two slight corrugations upon the outside of both halves of the sleeve and into the body of tube, but does not in the least injure the latter or alter its internal diameter at that point. Joints so made are impervious to moisture and have great strength. By the new method, joints may be made upon the floor or bench, and the lengths of tubing lifted with safety to the wall or ceiling without fear of straining or opening the joints. It is confidently believed that the new tool is destined to become an important factor of every wireman's kit of tools.

A THOROUGHLY BUILT PARLOR DOOR HANGER.

The construction shown in the illustration, in which parts are broken away to present the full details, represents a means of hanging heavy doors which seems to

leave nothing to be desired. The metal parts are made wholly of steel, except Norway iron rivets and the tread of the wheel, which is formed of leather, whereby the movement of the door is almost entirely noiseless. The door hangs directly under single supporting wheels,

and the rolling of the steel axle under the steel ways of the hanger reduces friction to a minimum and tends to keep the door straight and free from warping. The door is not cut anywhere, and all the parts are quickly applied and easily adjusted, the height of the door being readily changed at any time by the use of a screw driver without removing or jarring the

adjacent parts. This hanger is manufactured by the Messrs. Lane Brothers, of Poughkeepsie, N. Y.

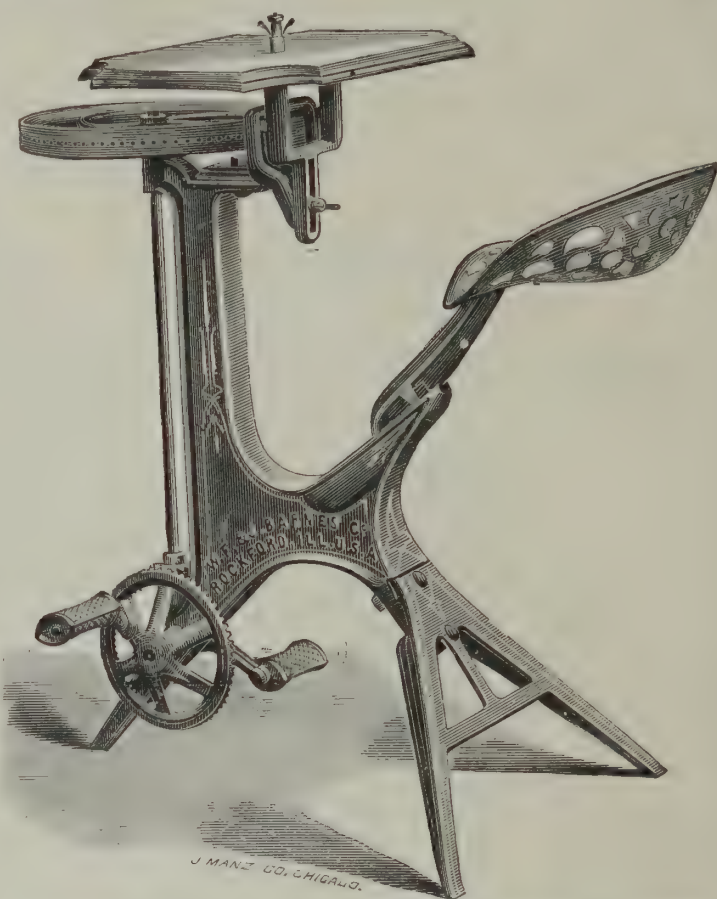
California Fruit.

A *Tribune* correspondent writes that 10,000 tons of fresh, dried, and canned fruits have been sent overland by rail from California during the season, and this enormous amount does not include what went by express. As much of the finest perishable fruit was expressed, this probably amounts to 100 car loads. The value of these overland fruit shipments is roughly estimated at \$10,000,000. Of prunes California shipped 15,000,000 lb., and of raisins 40,000,000 lb. Four thousand car loads of oranges will be sent East this winter, an increase of 800 car loads over last season. The first car load shipment of oranges this season went from northern California, where five years ago it was declared that oranges could not be grown except in gardens protected by hedges. This initial shipment came from Oroville, Butte County. A new feature this year is the shipment of early winter vegetables to the East, the railroads having made a favorable rate. Especially in Los Angeles and other southern counties this promises to be a great industry.

MESSRS. SAYER & Co., of New York, heretofore acting as agents of the Rider Engine Co. for the sale of the well known Rider hot air engine, have merged their business in that of the latter company, in which the members of the former firm of Sayer & Co. are now officers.

LABOR-SAVING APPLIANCES FOR THE CARPENTER AND BUILDER.

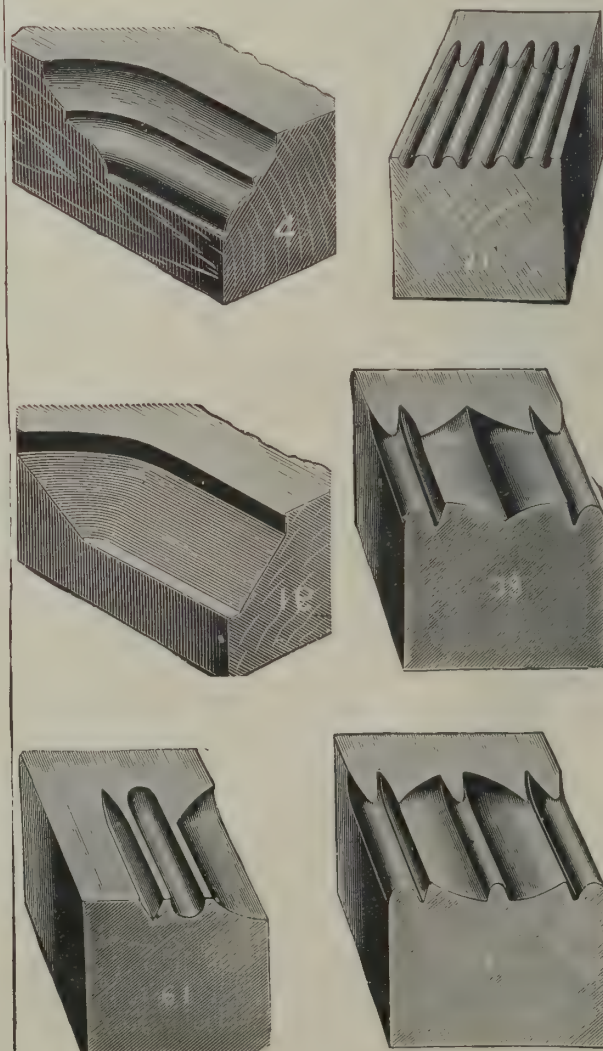
The accompanying illustration represents a foot power former or moulding machine, made by the W. F. & John Barnes Co., 567 Ruby St., Rockford, Ill. This



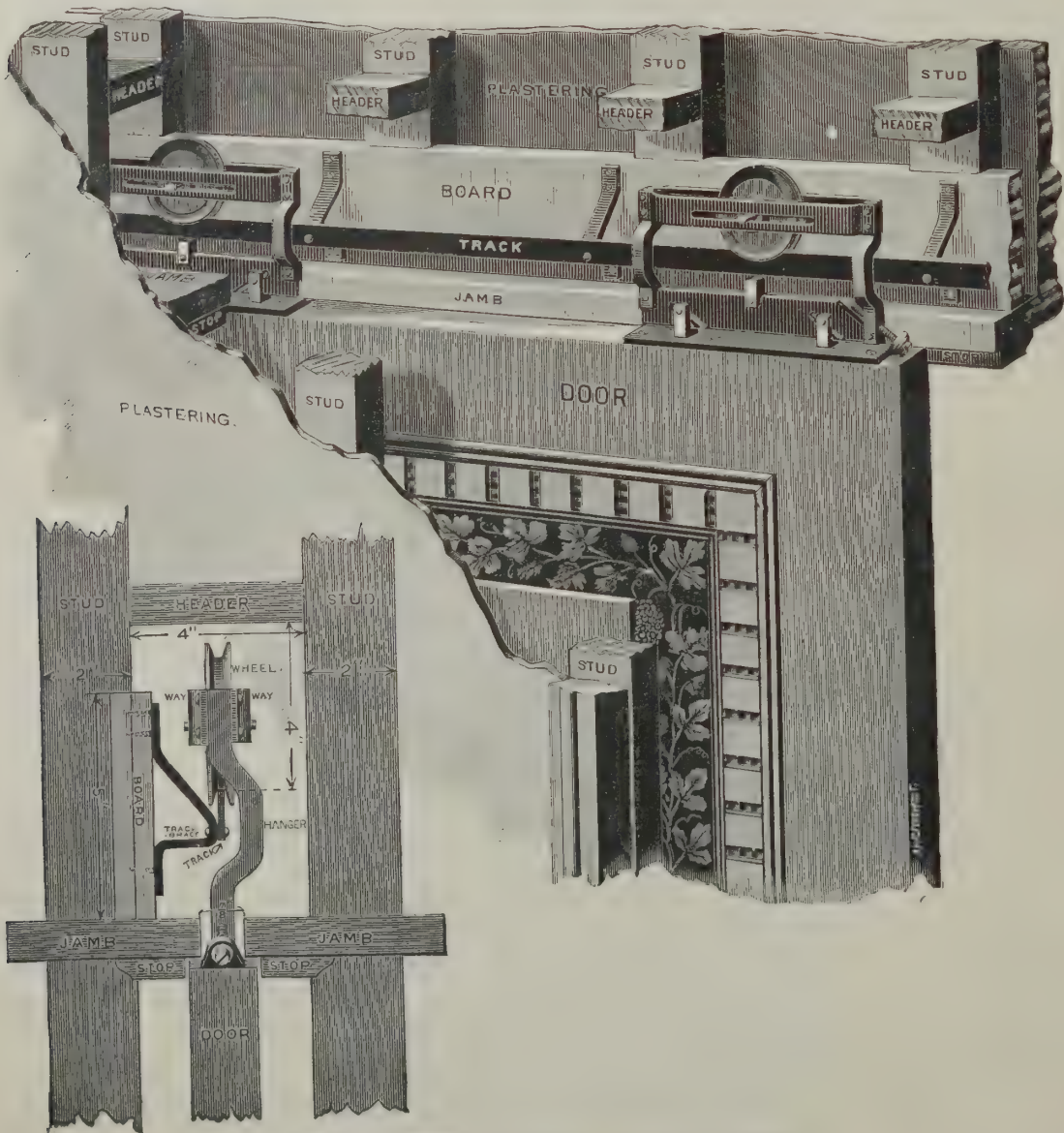
THE BARNES FOOT POWER FORMER OR MOULDING MACHINE.

former is extremely useful to the carpenter and builder, cabinet maker and other woodworkers, and the amount and quality of work which can be turned out on this small machine is truly wonderful. The manufacturers furnish a large variety of knives for different forms, a few illustrations of which are also given. This machine works equally well on hard and soft woods, and is therefore suitable for use in any locality, and as an indication that its range of usefulness is not restricted, the manufacturers tell us that during the present year they have shipped to foreign countries seventy or eighty of these formers, with over a thousand knives.

In addition to this machine, the Barnes Company make seven other machines for the use of woodworkers, all of them quite as valuable as the former in their respective lines of work, and on application the manufacturers will mail catalogue and price list describing the different machines and their accessories.



KNIVES USED IN BARNES MOULDING MACHINE.



LANE'S PATENT PARLOR DOOR HANGER.



# SCIENTIFIC AMERICAN

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ARCHITECTS

EDITION.

Vol. XL Subscription, \$2.50 a Year.

NEW YORK, MARCH, 1891.

Single Copies, 25 Cents. No. 3.

## RESIDENCE OF EDGAR A. BARTRAM, BRIDGEPORT, CONN.

This house, shown on page 39, is located at the corner of Fairfield and Colorado Aves. The exterior is clapboarded; the peaks of gables are paneled. The roofs are covered with black slate. Plate glass is used in the windows. The effect of the exterior is very pleasing, and especially so for a corner lot. The interior, as shown, is roomy and convenient. The kitchen connects with front hall through side lobby—a feature considered important by many people. The second story contains four large chambers, with ample closets, bath room and linen closet. The interior is finished in stained whitewood. This house can be built for from \$7,000 to \$8,500, according to work, fin-

ished in chestnut, the walls and ceilings of reception hall and dining room being wainscoted and elaborately paneled. The broad, low staircase, antique mantel, and paneled divan are the features of the hall, while the old casement window effect and seat make the dining room in keeping, and the several spindled transoms and beaded windows carry out the antique effect so successfully sought. Parlor is finished in white and gold. The back hall and stairs are conveniently located, and form access to the kitchen from the front hall, avoiding the disagreeable necessity of using the dining room for this purpose. The butler's pantries are of sufficient size to contain the usual fixtures, dressers, closet, etc., are well lighted and convenient.

above the foundation is built of Jersey graystone, trimmed with Tiffany brick. Roof shingled and painted red. All other woodwork painted bottle green. Vestibule has a tiled floor, and is wainscoted with mahogany laid in panels. Main hall is 16 ft. by 35 ft. It is in old English style, and is finished with rich mahogany. The ceiling is of mahogany, heavily beamed and ribbed, forming deep panels. The fireplace has hearth of tiles, facings of Mexican onyx, and mantel of mahogany, elegantly carved, with over-mantel running to ceiling. The staircase is an ornamental one, with carved newels, etc. The windows on second landing open into conservatory. This hall has a paneled wainscot. Reception room is trimmed with antique



RESIDENCE OF FRANK CROWELL, MINNEAPOLIS, MINN.—E. E. JORALEMON ARCHITECT.

From the Northwestern Architect.

ish, etc. Joseph W. Northrop, architect, Bridgeport. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

### A DOUBLE DWELLING.

On page 42 will be found illustrations of two semi-detached houses, erected for Mr. A. L. Pennock, at Philadelphia, Pa., which are very attractive in architectural and other features.

Dimensions: Front, 44 ft.; side, 63 ft. 6 in., exclusive of piazza and porch. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The exterior walls are built of broken ashlar stone and brick. The gables are shingled and painted red. Roof slated. The columns and all woodwork to piazza are of Georgia pine, finished natural. The first floor is handsomely

The kitchens are roomy, the walls being of hardwood, the ceilings being hip form, with the rafters exposed to view, the space between them being of hardwood. The second story is finished in hardwood, and contains three bed rooms and bath, and the third floor contains three bed rooms finished in equal respects to second floor. Cemented cellar contains furnace. Approximate cost, \$15,000 each. F. U. Beal, New York, architect.

### A RESIDENCE AT HARTFORD, CONN.

We present on page 41 a residence erected for Mr. F. Chamberlain, at Hartford, Conn., Mr. Francis H. Kimball, of New York City, architect.

Dimensions: Front, 69 ft.; side, 56 ft., not including piazza. Height of ceilings: Cellar, 8 ft.; first story, 11 ft.; second, 10 ft.; third, 9 ft. The superstructure

oak, parlor with mahogany, and dining room with quartered oak. The pleasant little nooks in hall and parlor are separated by an arch, supported on columns with carved capitals. Fireplaces are fitted up similar to the one already described. Dining room is wainscoted. Kitchen, laundry, pantries, and other apartments are trimmed and wainscoted with ash, finished natural with hard oil. Second floor contains bath room and four bed rooms, furnished with dressing rooms and closets, besides two servant's bed rooms. These rooms are trimmed with mahogany, oak, and ash, respectively. There are four bed rooms and billiard room on third floor, trimmed with various kinds of hardwood. Cellar contains furnace and other apartments. Cost \$60,000 complete. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.



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A. E. BEACH.

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THE

Scientific American,

ARCHITECTS AND BUILDERS EDITION.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

A special feature is the presentation in each number of a variety of the latest and best plans for private residences, city and country, including those of very moderate cost as well as the more expensive. Drawings in perspective and in color are given, together with Floor Plans, Specifications, Costs, etc.

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A RESIDENCE AT STRATFORD, CONN.

One of our plates in colors, this month, shows a residence erected for Mr. P. H. Hodges, at Stratford, Conn. Messrs. Lambert & Bunnell, architects, Bridgeport, Conn. Dimensions: Front, 51 ft.; side, 65 ft., not including piazza. Height of ceilings: cellar 8 ft., first story 10 ft., second 9 ft., third 8 ft. Foundation is built of cut bluestone. The superstructure above is of wood, and covered with clapboarding. Roof slated. Plans show plenty of large rooms, which are conveniently arranged and fitted up in the best manner. Hall 16 by 16 ft., is trimmed with ash. It contains two large coat closets and an ornamental staircase, lighted by a stained glass window. Parlor, trimmed with whitewood, is stained and finished in cherry. It contains a fireplace provided with a tiled hearth and a hard wood bric-a-brac mantel. Sitting and dining rooms are trimmed with Georgia pine, finished natural, the former having a fireplace built of brick and a hard wood mantel. All other apartments are trimmed with Georgia and white pine. The floors are of Georgia pine, laid double, with felt paper between. 2½ in. thick. Kitchen, pantries, and other apartments are wainscoted. There are four bed rooms, den and bath room on second floor, and two bed rooms, storage and tank room on third. Good closets. Bath room wainscoted and finished in cherry. Tank room contains a tank holding 10,000 gallons. Cemented cellar contains laundry, furnace, and other apartments. Cost of house complete, including plumbing and furnace, \$8,000.

Our plate was made direct from a photograph of the building taken especially for the SCIENTIFIC AMERICAN.

A RESIDENCE IN RIVERSIDE PARK, NEW YORK CITY.

We present in this issue a colored plate showing a residence erected for George Noakes, Esq., in Riverside Park, New York City. A. B. Jennings, of New York, architect. Dimensions: Front 39 ft. 6 in., side 63 ft. 6 in. Height of ceilings: cellar 8 ft., first story 11 ft., second 10 ft., third 9 ft. The design is admirable; it combines both elegance and convenience, and has many pleasing features, such as porches, bay windows and oriel bay rising into a tower. Exterior walls throughout are built of rock-faced granite, trimmed with stone from the Mine Hill quarries, Connecticut. Porches and conservatory are paved with white marble; vestibule with unglazed tiles. Hall is trimmed with mahogany. The walls and ceilings are of similar wood, heavily beamed and ribbed. The staircase is an elaborate one, with carved newels. It is lighted by stained glass windows. Fireplace has tiled hearth and facings and mahogany mantel. Parlor is trimmed with ebony, music room with maple, and dining room with ancient oak. Music room contains a fireplace fitted up similar to one in hall. Dining room is provided with two china closets with doors glazed with stained glass, and, as these closets are lighted from the outside, the effect is excellent. Kitchen, laundry, rear hall, and pantries are trimmed with Georgia pine, finished natural with hard oil. These apartments are replete in all their appointments. Second floor contains four bed rooms, two bath rooms, den, and dressing room, all trimmed with ash. Bath rooms are wainscoted with white English tiling, and are fitted up in the best possible manner. Six bed rooms on third floor. Cellar contains billiard room, finished in oak, and other apartments complete. Cost, \$30,000.

Our plate was made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

In our next number we expect to present some additional plates of this residence.

MR. T. HARRISON'S RESIDENCE, EDGECOMBE COURT, CHICAGO, ILL.

On page 43 we publish two floor plans and photographic view, taken specially for the SCIENTIFIC AMERICAN, of the above cottage residence, which is situated at Buena Park, some five or six miles from the center of the city of Chicago, on the north side. The house is cellared throughout, and the basement and first story are built of brick, the second story and roof being shingled. The front of the house is prettily ornamented with glass of varied colors, which has a very pleasing effect. A veranda extends across the front of the house at a height of 3 ft. 6 in from the ground. The parlor opens to the right of the hall, and measures 14 ft. by 14 ft. It is lighted by a large bay window, contains angle fireplace and glass closet, and communicates with the library by sliding doors. The library has also a separate entrance from the hall through sliding doors, and measures 13 ft. by 13 ft. The dining room is 12 ft. by 12 ft., and is lighted by two mullioned windows. It may be entered either from the hall direct or from the kitchen. The kitchen is 9 ft. 6 in. by 12 ft., and contains range and all conveniences, also back staircase and rear porch. There are four chambers on the second floor, with closet room and dressing room attached to principal chamber, toilet room with bath,

water closet, etc. This is a very pretty cottage and is estimated to cost \$5,400.

A PILLAR COTTAGE, PENNSYLVANIA.

Our illustration, page 44, presents a cottage erected for Mr. G. W. Childs, at Wayne, Delaware County, Pa.

Dimensions: Front, 37 ft. 6 in.; side, 47 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Main part of first story is built of stone, laid at random, and coated with plaster. This plaster work is dashed with pebbles, and painted colonial yellow, with quaint effect. Rest of first story is of wood, clapboarded, and painted bottle green. Second and third stories are covered with shingles, and stained moss green. Roof shingled and painted red. The trim throughout is of whitewood. Vestibule, hall, and dining room are stained and finished in antique oak, and parlor in cherry. Reception room is painted ivory white (china gloss), with a little gilt. Rest of trim is finished natural. A novel feature has been produced by joining back and front stairways. Parlor has an open fireplace, furnished with a neatly tiled hearth and a hardwood mantel, with mirror, etc. Kitchen, laundry, and pantries are wainscoted with narrow beaded stuff, and fitted up complete. Laundry is provided with stationary soap-stone tubs. There are five bed rooms and bath on second floor, each opening into hall. Two bed rooms on third floor, good closets in every room. Cemented cellar under whole of building contains furnace. Cost, \$6,000 complete. Our engraving was made direct from a photograph of the house taken specially for the SCIENTIFIC AMERICAN.

RESIDENCE AT HARTFORD, CONNECTICUT.

On page 45 we illustrate a house erected for Mr. W. A. Sanborn, at Hartford, Connecticut, Wm. B. Tubby, architect, New York City. Dimensions: Front, 48 ft.; side, 51 ft. 6 in., exclusive of piazza and porte cochere. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. The design is a mixture of Queen Anne and Colonial architecture, and the lines are well broken by many bay windows, loggias, and a spacious piazza. Underpinning is built of dark red sandstone and chimneys of "mottled" brick. The superstructure above is wood, covered with shingles and stained senna. Roof shingled and stained moss green. Hall, spacious, is trimmed with quartered oak; it has oaken pilasters running to ceiling, with carved capitals, ceiling beamed and ribbed, forming deep panels, an open fireplace and an elegant staircase of Moorish design, with carved newels, balusters, etc. This staircase is lighted by numerous stained glass windows, which shed a soft and pleasant light over the upper and lower halls. Parlor and library are trimmed with cherry and dining room with oak, the latter having a paneled wainscoting and ribbed ceiling of oak. Fireplaces, where shown, have tiled hearths, Mexican onyx facings and elegant hardwood mantels, carved and made from special designs. Floors of hard wood, highly polished. Kitchen and its apartments are trimmed and wainscoted with oak and fitted up replete. There are four bed rooms and bath room on second floor, also plenty of good closets. These rooms are trimmed with various kinds of hardwood. Bath room is paved and wainscoted with white English tiling. Third floor contains three bed rooms and billiard room. Cemented cellar contains laundry, furnace, and other apartments. Cost \$19,000 complete, including mantels, furnace, range, plumbing, and everything ready for occupancy.

Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

Preserving Smoke Pipes from Rust.

Paint the pipe thoroughly, either with coal or wood tar, then fill it with shavings, and set them on fire. The heat roasts the tar, and, at the same time, opens the pores of the iron, which appear to become filled with carbon, and to be thus preserved from rusting for an indefinite period. A smoke flue is mentioned which was thus treated twenty-six years ago, and is still in good condition.

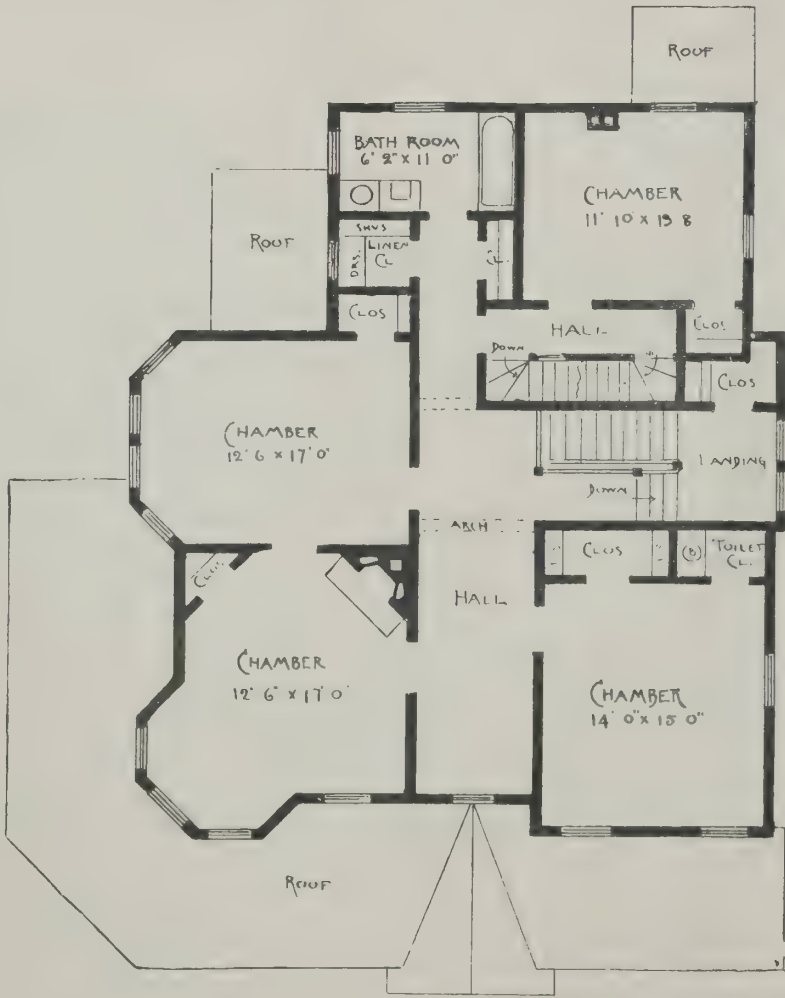
Painting with ordinary coal tar and air-drying is also much in use for smoke stacks, the heat by use making the necessary union for preserving the iron.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.





FIRST FLOOR PLAN



SECOND FLOOR PLAN

[See page 37.]

RESIDENCE OF E. B. BARTRAM, ESQ., BRIDGEPORT, CONN.





## DOOR HANGING.

It is peculiar to note that, practically, but little improvement has been made in the hanging of room or outer doors, except that which has been effected by the hinge maker, who certainly has introduced a good deal of ingenuity into his work, particularly of late years, but which has not done away with the unsightly gaping crack that always appears down the hinged edge of a door when it is opened to even a trifling extent, this crevice permitting any one outside to view the greater part of the apartment within almost at a glance, and also allowing a keen draught to pass through, which, although not objectionable in summer, is intolerable in winter, and it is in winter that the draught is stronger, by reason of the fire being alight in the room. Yet both of these objections can be obviated in a most simple and inexpensive manner—so cheaply, in fact, that every door in the house might be so fitted, from the kitchen to the attic.

The want of such a remedy has been quite recognized for many years, and probably from the time that doors were first introduced, and resource has been had to strips of ornamental leather, draught tubing, etc., and with valuable doors, by making the edge of the inner stile semicircular, this rounded edge fitting and working in a circular recess in the door frame, or post; but this latter means necessitates very skillful workmanship, and, as a butt hinge cannot be used, the door has to be pivoted top and bottom at proportionately greater expense. There are also other ways of fashioning the stile edge and door frame to the same end; but none has general favor for common doors, on account of the greater cost.

The method about to be described may have occurred to the minds of many of our readers, and may probably be found in use, its simplicity being so marked that it cannot have escaped notice; but that it is not generally known is quite certain, and this fact makes its description desirable.

It is, of course, within every one's knowledge that a hinged door when in the act of opening describes a segment of a circle, as indicated by the arrows in Fig. 1, and this circular movement not only takes place at the outer edge, but at all points along the width of the door, even at the hinged edge (where, of course, the circle described is much smaller), as indicated by the arrow point and dotted line in Fig. 2. It is this circular movement that throws open the joint that must exist between the door-stile and the door-post, this joint being perhaps perfectly close while the door is shut.

Now, if we take a slip of wood with a circular bead at its edge, as Fig. 3 (section about full size), or the bead could be provided at the extreme edge or a piece of moulding, as Fig. 4 (about half natural size), and place it so that the bead covers the joint between the stile and the frame, the remedy is complete, as the hinged edge of the door will be found to work *around* this bead without the least difficulty, not in any way coming in contact and wedging one against the other, as may be supposed, but working freely, and in a manner that will please the eye of a skilled workman, and the object aimed at will be found to be fully attained, as this bead will obstruct the view through the fissure, and it will make it very nearly draught-tight.

In applying this bead for the purpose explained, it is necessary to observe just three things: First, the bead must be round, as shown in Fig. 3. Secondly, it must be placed so that the center of the bead comes over the joint (when the door is closed), so that a straight line continued from the joint would intersect the bead as near as possible exactly across the center. Thirdly, the size of the bead is governed by the projection of the knuckle of the butt, so that a 3 inch butt, which is commonly fixed with the knuckle projecting  $\frac{1}{8}$  inch to the center of the pin, would require a  $\frac{1}{4}$  inch bead—i. e., whatever the projection from the stile to the center of the hinge pin is, then the bead requires to be double this size. But this is only a theoretical measurement, as the edge of the stile never comes perfectly tight against the door frame, and a little larger bead will generally be found desirable, but this can be ascertained by offering up a piece of bead or even a pencil, but it is not at all necessary that a very exact fit be obtained, as moderate accuracy will be found quite sufficient.

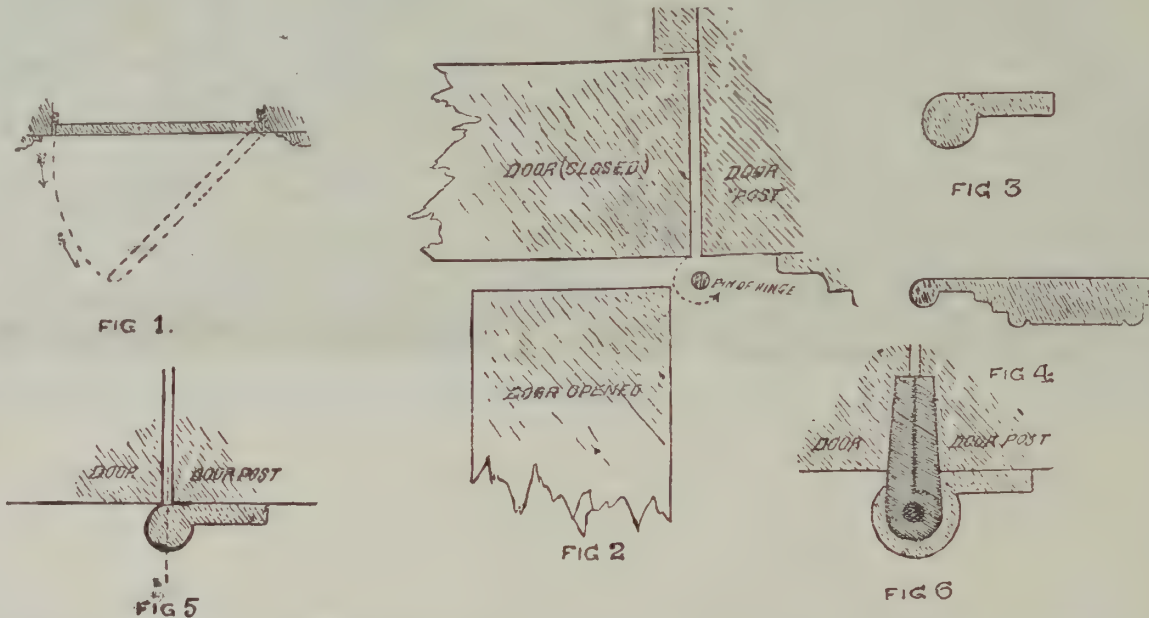
Fig. 5 shows the position of the bead over the joint, the dotted line showing how the center of the bead should be made to come opposite the joint; and Fig. 6 shows the butt and the outline of the bead (which

comes above and below it, as no bead can be placed just where the butt projects); and by referring to Fig. 2 it will be seen how the stile travels *around* the bead as the door is opened, the bead all the while obstructing the view and the passage of draught through the joint. This can be more readily understood by cutting a piece of cardboard as Fig. 6, but making two pieces of it, so that by placing a pin through the center of the butt knuckle, the door portion can be made to open and close, as it were, on its hinges.

It will be noticed that in Fig. 6 a large sized bead is shown, this being necessary by the greater projection of the butt knuckle. This suggestion will be found easy of application, and there is no reason why it should not be adopted with all doors, as it is generally recognized that although an open crack always shows itself down the hinged edge of a door when it is open, it would be much better were the crack absent. —*Building News.*

## MR. G. DAVIS' RESIDENCE, CENTRAL AVENUE, AUSTIN, CHICAGO.

We publish, on page 46, two floor plans and photographic view taken specially for the SCIENTIFIC AMERICAN of the above residence, No. 123 Central Avenue, one of the principal avenues in the city of Chicago. The house is cellared throughout, the basement being built of rock-faced stone, the rest being of frame construction. First story covered with clapboards, and upper stories and roof shingled. A veranda extends across nearly the entire front at 3 ft. 6 in. above the grade line, and the main hall opens off this. On the side is a *porte cochere*, 10 ft. wide, and of handsome design, over which a balcony extends. The parlor, 17 ft. by 19 ft., opens off the main hall on the left hand side through sliding doors. It is lighted by



two mullioned and two single windows. On the opposite side of the hall is the reception room, 14 ft. 3 in. by 14 ft. 3 in., which is entered through sliding doors and lighted from large bay window which extends the width of room. The dining room is situated at the rear of the parlor, measures 19 ft. by 20 ft., and is lighted from large bay window overlooking the piazza. The kitchen is situated abreast of the dining room, measures 11 ft. 6 in. by 14 ft. 3 in., is well lighted and fitted with every convenience. A side hall divides this room from the reception room. The second story comprises five chambers, closets, and toilet room, with all modern conveniences, off which the covered balcony over *porte cochere* opens. There is also commodious attic room. There are good stables situated at the rear of the house of frame construction. A very pretty effect is obtained by small stained glass squares in the upper sashes and the ornamentation on gables. This house makes altogether a most comfortable residence, and is estimated to cost \$7,000.

## A SUBURBAN COTTAGE.

We present on page 47 a very compact, convenient and attractive cottage of modern design, erected for Mr. E. W. Given, at Mont Rose, Orange, N. J. Dimensions: Front 36 ft., side 41 ft., exclusive of piazza. Height of ceilings: Cellar 7 ft., first story 9 ft., second 8 ft. 6 in., third 8 ft. Foundation of stone. The exterior throughout, from grade line, is covered with shingles, left to weather-finish, with trimmings and blinds painted bottle green. Lobby, hall, and reception room are trimmed with antique oak, parlor and dining room with whitewood finished natural. Hall, 9 ft. 6 in. wide, communicates with all rooms, thus avoiding the necessity of making a passageway of any particular room. This hall has an ornamental staircase of oak. The fireplaces are built and faced with buff brick, and have tiled hearths and hard wood mantels.

Kitchen and its apartments are trimmed and wainscoted with Georgia pine, finished natural.

Butler's pantry has a dresser, shelves, drawers, and sink, a large store pantry off kitchen. Second floor contains four bed rooms and bath, all trimmed with white pine, finished natural, and each provided with a large closet. Two bed rooms on third floor. Cemented cellar contains laundry and furnace. Cost \$5,500 complete. Rossiter & Wright, architects, New York.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## MR. ALVIN HAMILTON'S RESIDENCE, ALEXANDER AVENUE, BUENA PARK, CHICAGO.

On page 48 we publish two floor plans and photographic view, taken specially for the SCIENTIFIC AMERICAN, of the above picturesque residence. The house is cellared throughout, and the basement story is of brick, the first story frame covered with clapboards, and the upper stories and roof shingled. A veranda extends across the whole front, 3 ft. 6 in. above the grade line. The entrance is on the right hand side, and to the left of the main hall the parlor is situated, entrance being made through a portiere. This room measures 14 ft. by 18 ft., has angle fireplace and large bay window, which extends the width of the room.

The library is situated abreast of this room and opens off it through sliding doors. It also communicates with the dining room, has angle fireplace and a mullioned window looking on to the front lawn. The dining room is at the rear of the library, and opens off it, having also separate entrance from the inner hall and from the kitchen. It is lighted by large bay window and contains handsome angle fireplace. The kitchen measures 14 ft. by 15 ft., and is fitted with every convenience, opening on to

inner hall and rear porch. There is a den at the end of the main hall, and the pantry is just at the rear of this. There are four chambers and one dressing room, also toilet room on second story. The total cost is estimated at \$5,000.

THE National Association of Builders of the United States held its fifth annual convention in New York on the 9th of February. Interesting addresses were made by the president, John J. Tucker, and by secretary Wm. H. Sayward. The trade schools of this city were visited, and the members had an opportunity of seeing the

various classes of the school, composed of many young men, actively at work in learning plumbing, bricklaying, carpentering, and other trades. The visit gave the greatest satisfaction to all concerned. On the second day reports from various committees were presented, such as reports on contracts, arbitration, the surety company, amendment of constitution, etc. Various papers were read. One by John L. Wilkie, on Strikes and Boycotts, was quite vigorous. The following officers were elected: President, Arthur McAllister, of Cleveland; vice presidents, Anthony Ittner, of St. Louis, and Ira G. Hersey, of Boston; secretary, W. H. Sayward, of Boston; treasurer, George Tapper, of Chicago. Time of next convention, January 18, 1892. Place, Cleveland, Ohio.

A calculating genius has arrived at the fact that every time a cow moves her tail to switch a fly she exerts a force of three pounds, and that in the course of the summer a single cow wastes 5,000,000 pounds of energy. Hence the conclusion that the cows of America throw away power enough to move every piece of machinery in the world.

## PATENTS.

Messrs. Munn & Co., in connection with the publication of the Scientific American, continue to examine improvements and to act as Solicitors of Patents for Inventors.

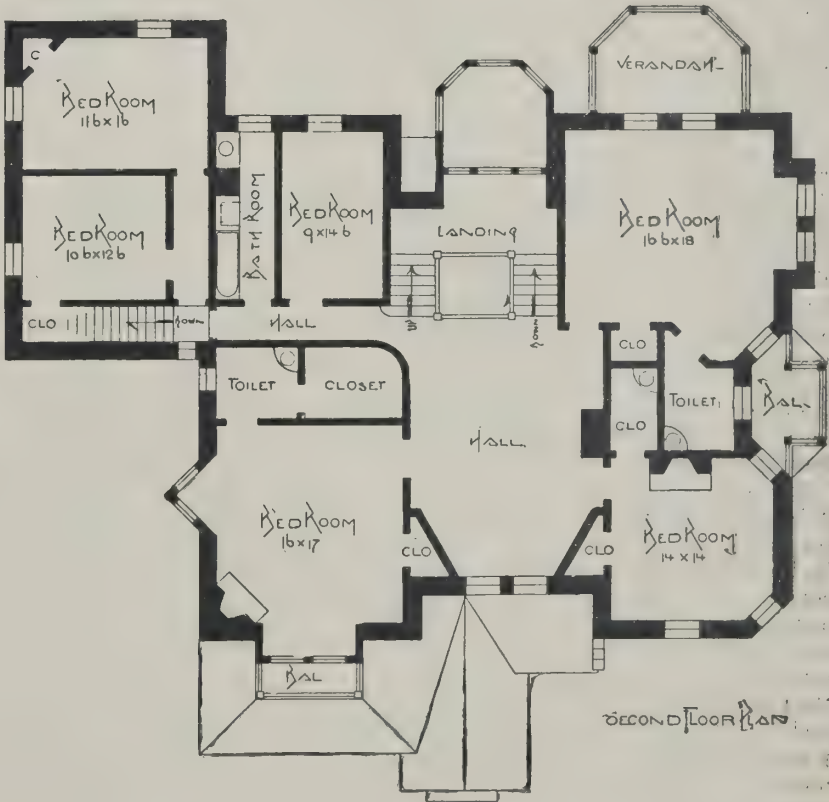
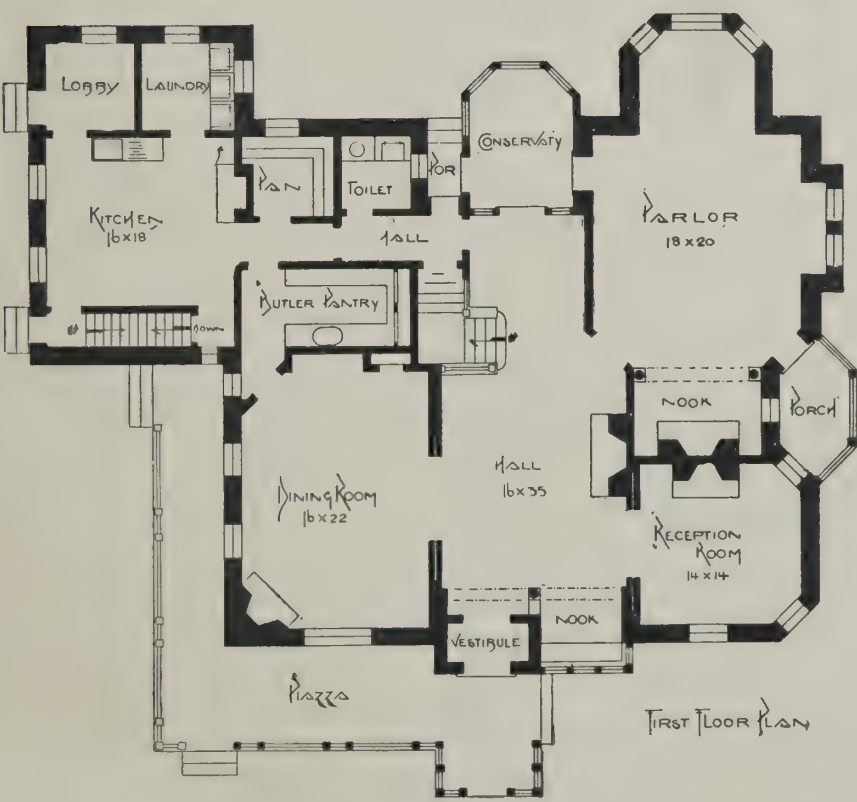
In this line of business they have had forty years' experience, and now have unequalled facilities for the preparation of Patent Drawings, Specifications, and the prosecution of Applications for Patents in the United States, Canada, and Foreign Countries. Messrs. Munn & Co. also attend to the preparation of Caveats, Copyrights for Books, Labels, Reissues, Assignments, and Reports on Infringements of Patents. All business entrusted to them is done with special care and promptness, on very reasonable terms.

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We also send, free of charge, a synopsis of Foreign Patent Laws, showing the cost and method of securing patents in all the principal countries of the world.

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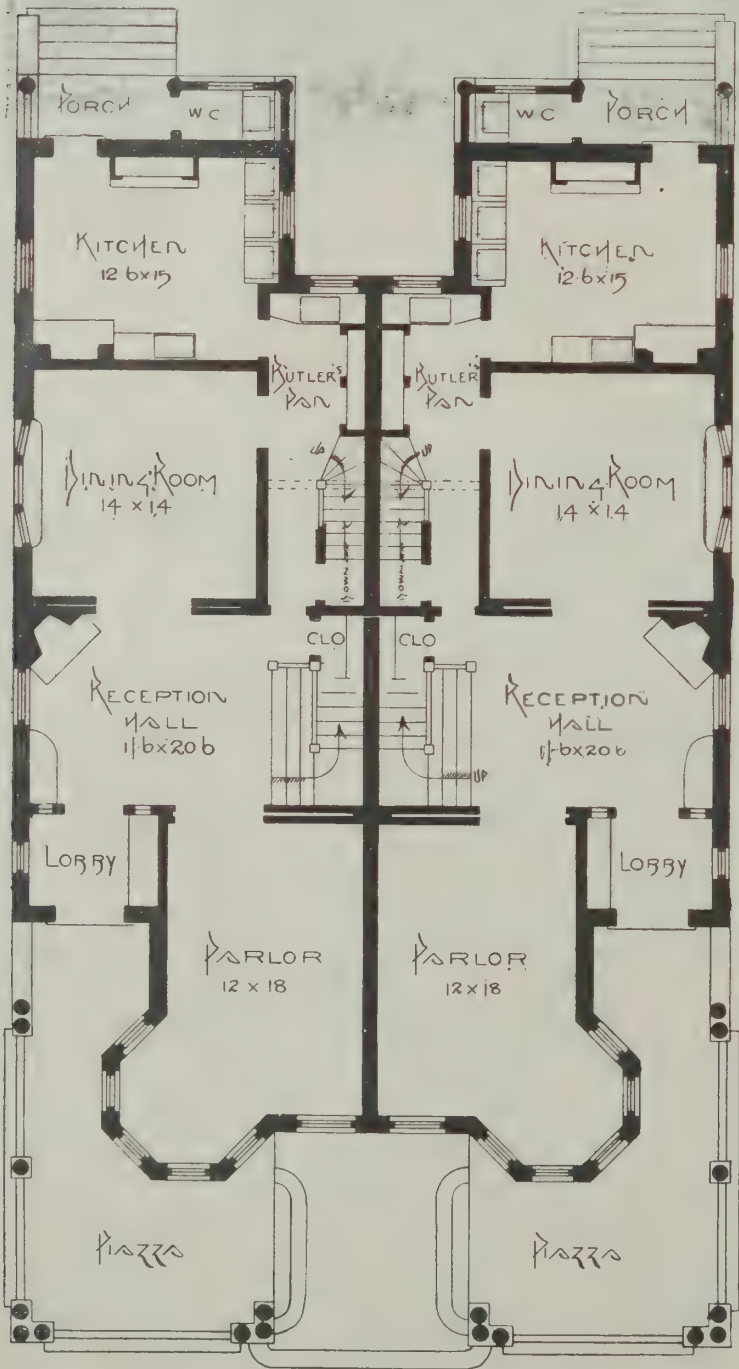


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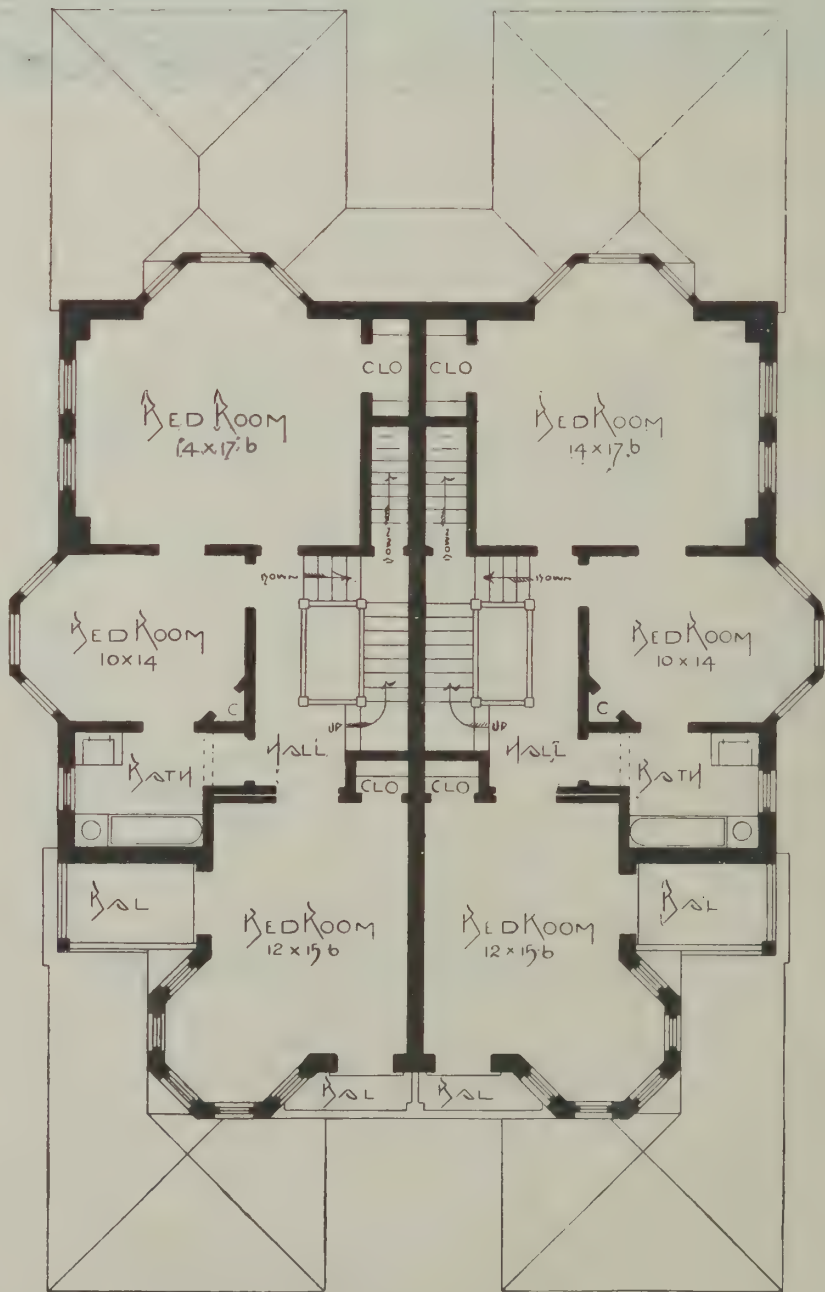
A RESIDENCE AT HARTFORD, CONN.







FIRST FLOOR



SECOND FLOOR

[See page 37.]

A DOUBLE DWELLING.







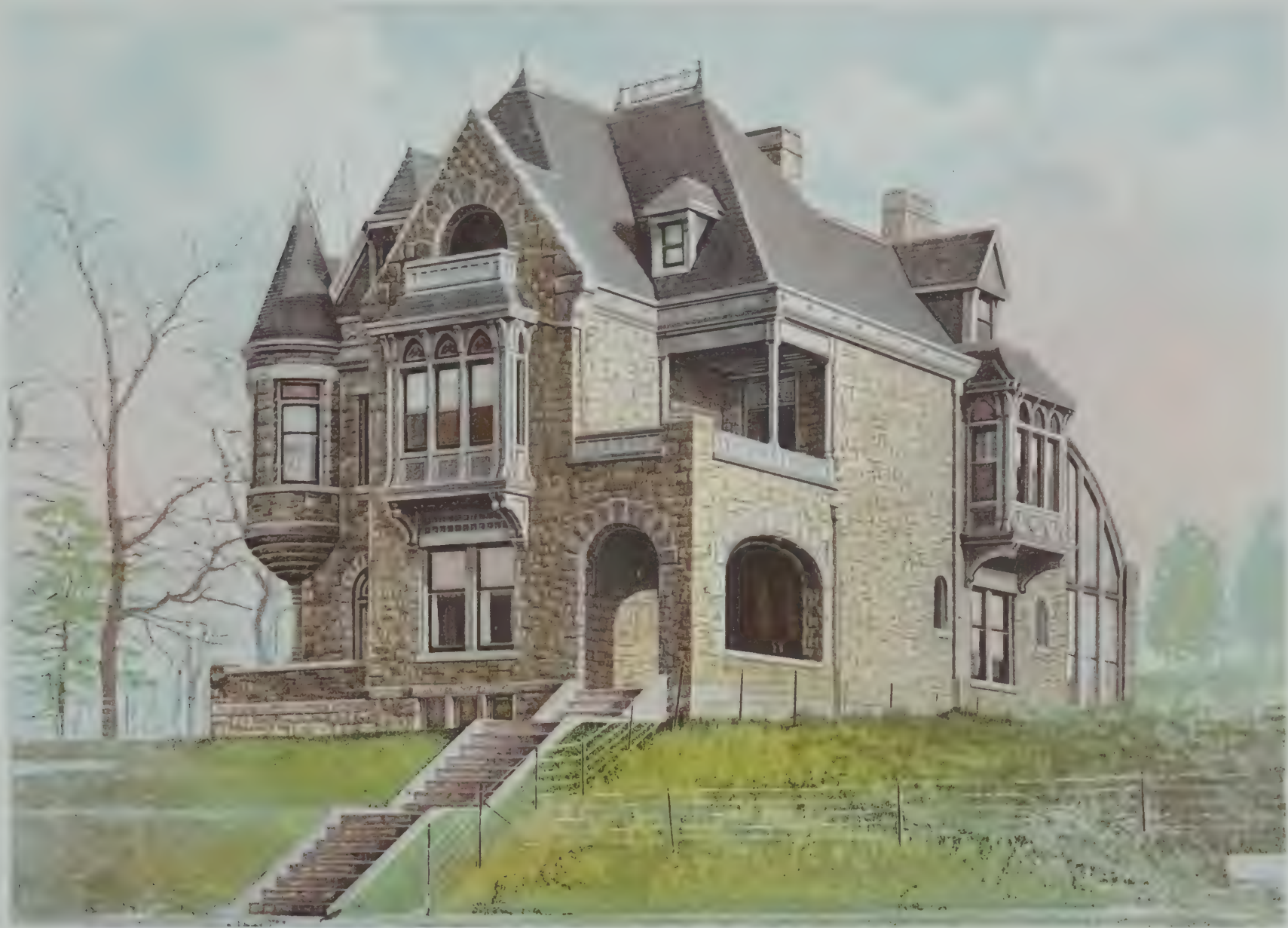




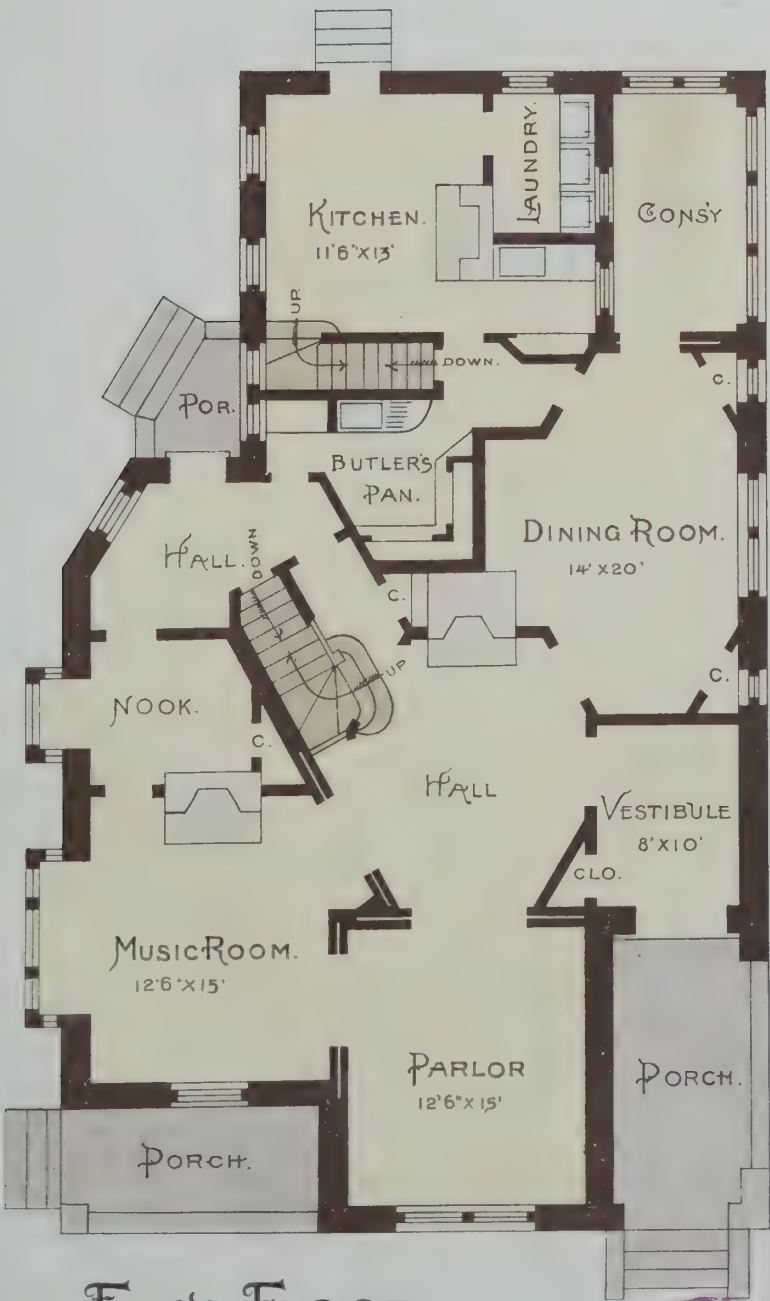
A RESIDENCE AT STRATFORD, CONN.



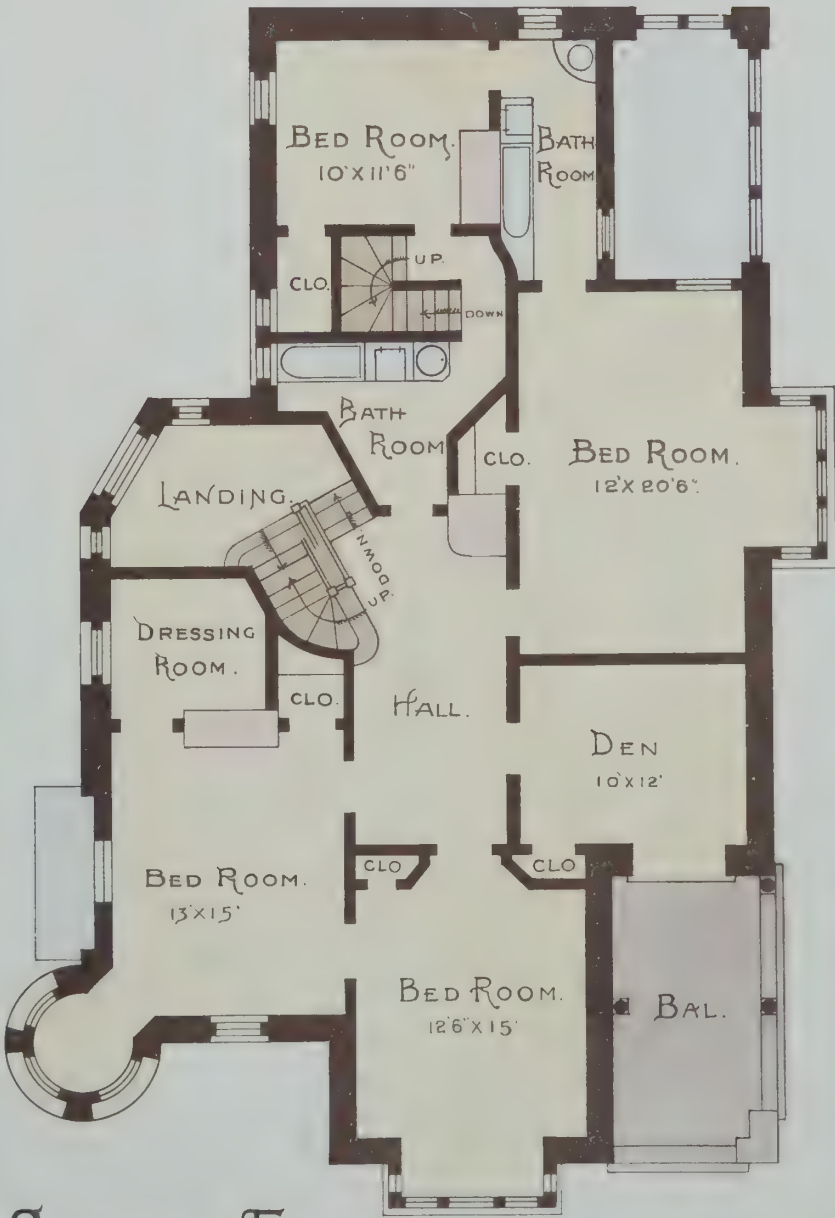




A RESIDENCE ON RIVERSIDE PARK, NEW YORK.



FIRST FLOOR.

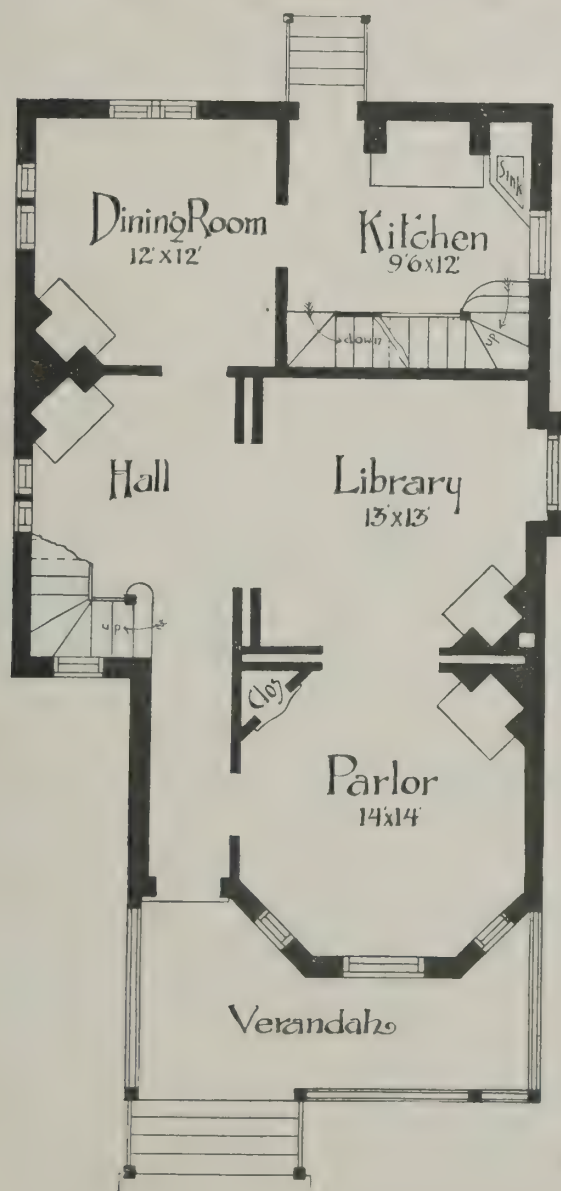


SECOND FLOOR

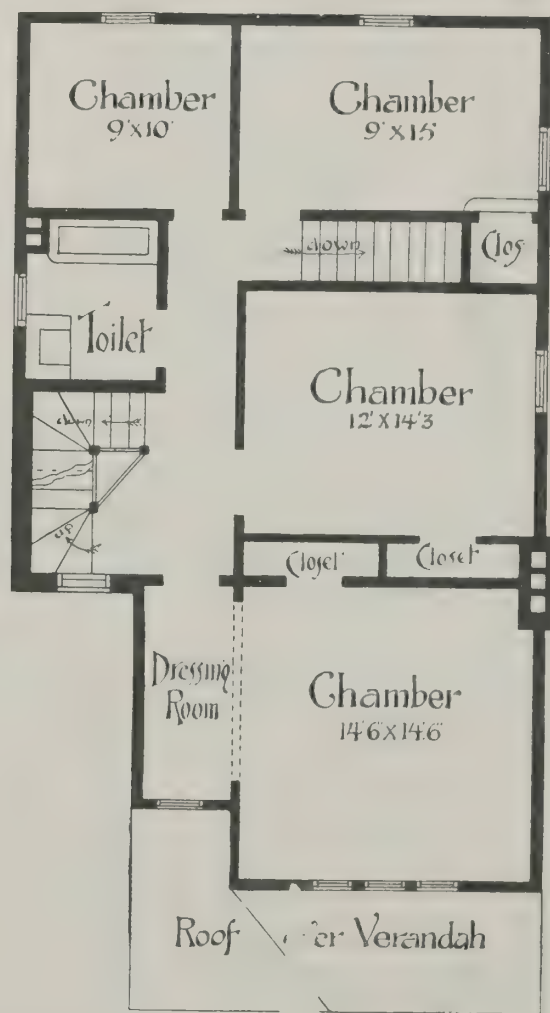








First Story Plan.

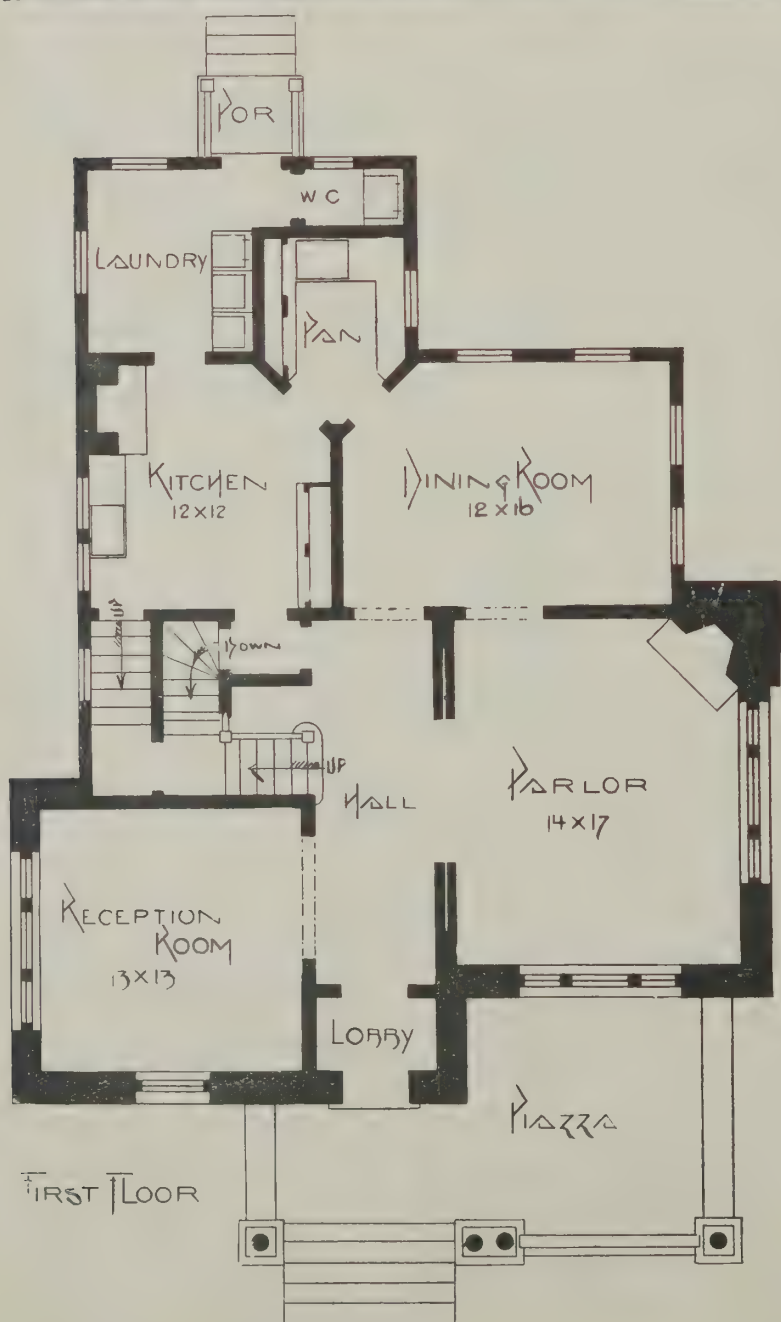


Second Story Plan.

Mr. T. Harrison's Residence at Edgecombe Court, Chicago.





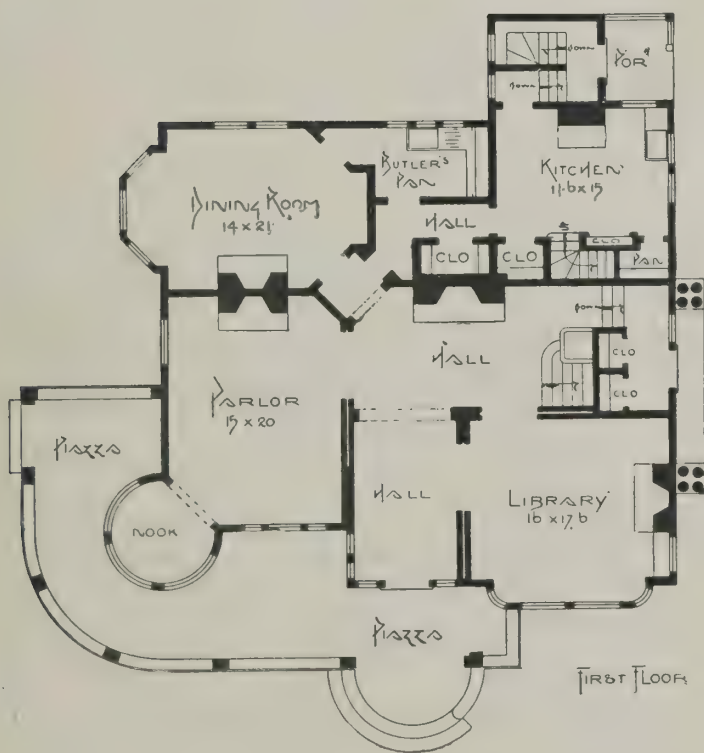


[See page 38.]

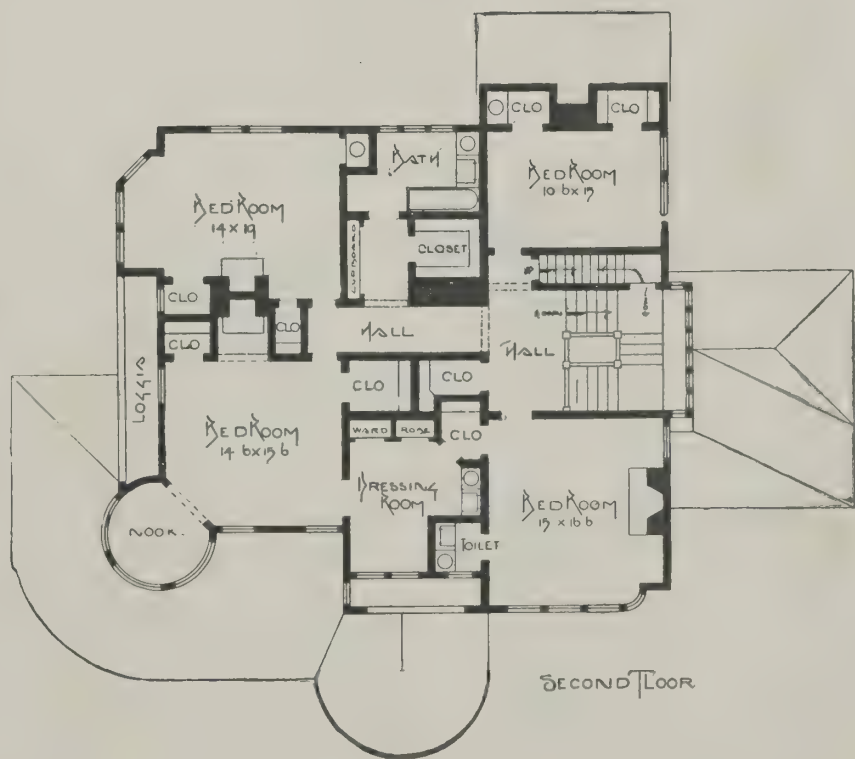
A PILLAR COTTAGE.







ORTE-  
CHERE

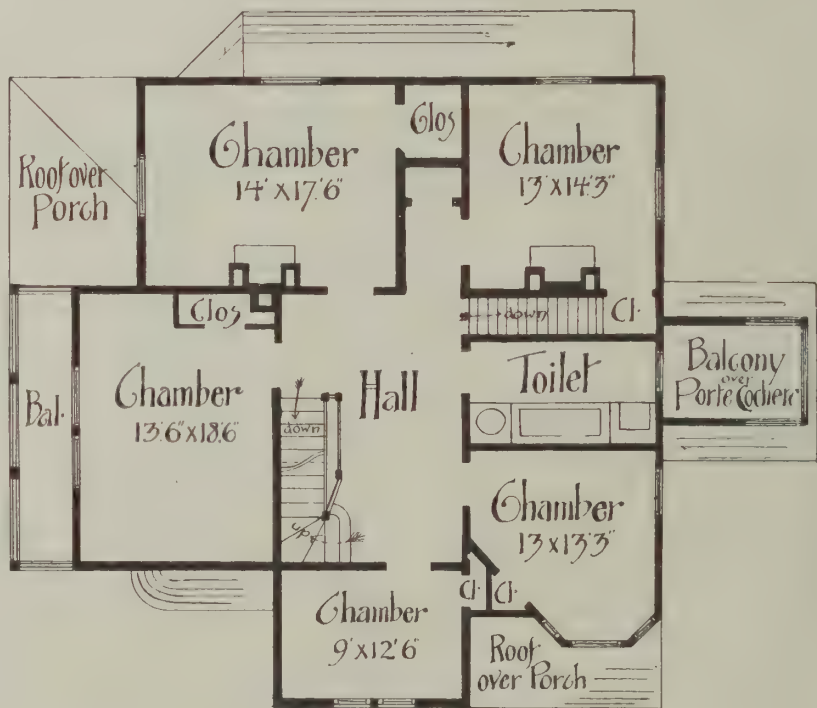


[See page 38.]

A RESIDENCE AT HARTFORD, CONN.





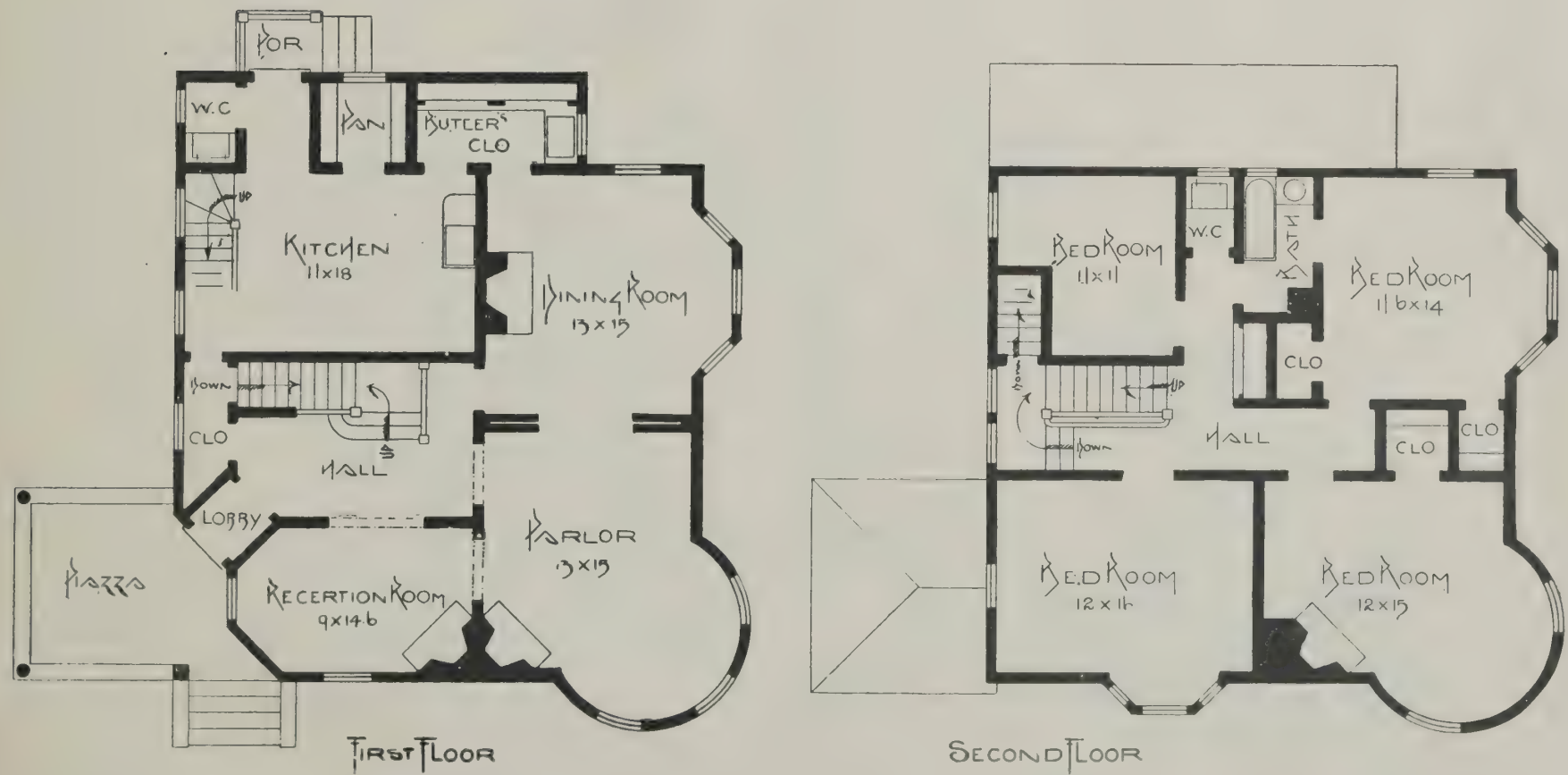


[See page 40.]

First Floor Plan. Second Floor Plan.  
 © Mr. G. Davis' Residence, Central Ave., Austin, Chicago, Ill.





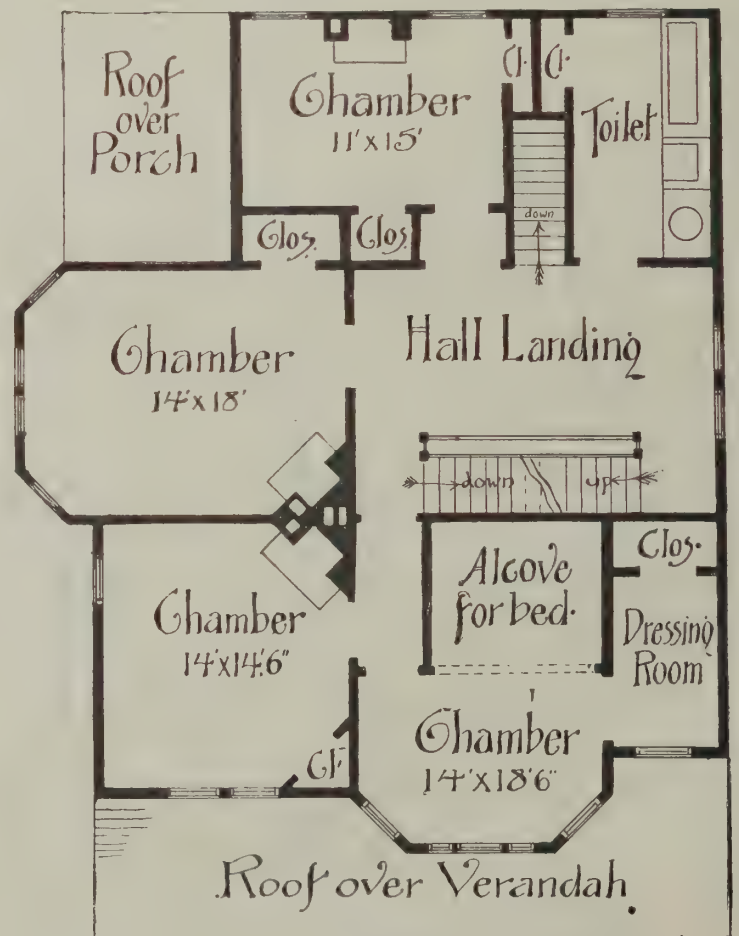


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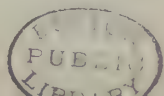
A SUBURBAN COTTAGE.







Mr. Alvin Hamilton's Residence Alexander Avenue,  
Buena Park, Chicago. [See page 40.]





### SAFE CONSTRUCTION OF BUILDINGS.

At the last great fire in Boston, some of the modern fireproof structures actually crumbled from intense heat, while iron roofs were gradually expanded until the walls were forced apart, permitting the whole structure to collapse. It is said that 80 per cent of all fires are extinguished where the loss falls below \$100,

the sides so as to provide air for the heavy timber ends, preventing dry rot, which is so liable to occur whenever heavy timbers are excluded from the air or covered with air-tight material. Beams are frequently sealed so tightly where they enter the wall that dry rot takes place in the walls while the exposed portion of the beam within the room is entirely sound.

sustaining post be destroyed. Nearly twenty buildings have so far been supplied with the new Goetz-Mitchell anchors. For further particulars address the company, 78 State Street, New Albany, Indiana.

THE National Hot Water Heater Co., of Boston, have opened a New York office at 94 and 96 Center

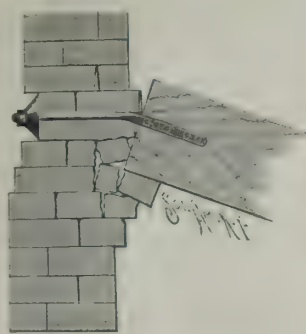


Fig. 1.

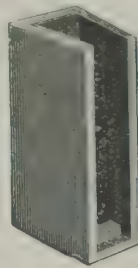


Fig. 2.

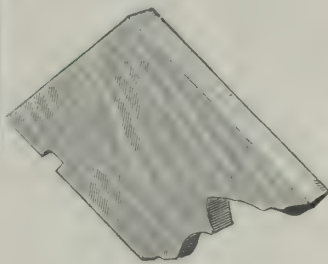


Fig. 3.

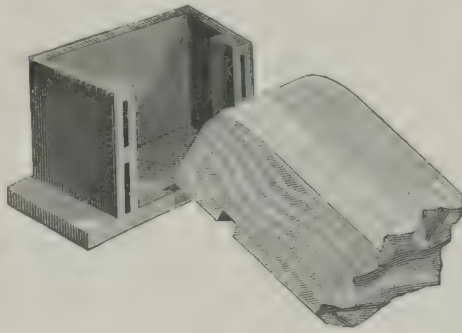
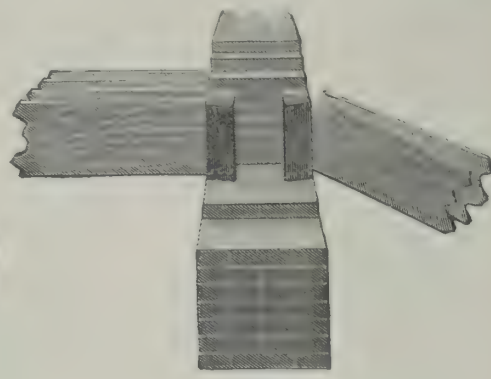


Fig. 4.



and where the loss passes this amount the damage is very likely not to stop short of total destruction of the premises and those adjoining. The total loss by fire last year was computed at \$125,000,000; \$75,000,000 representing the loss where fire originated on the premises, and \$50,000,000 the loss that was caused wholly by exposure, that is where fire was communicated from adjoining buildings.

The method of anchoring a building is one of the most important items in its construction, but proper anchoring is very often neglected. The method usually practiced consists of fastening an iron strap to the sides of the joist, and securely building the same into the wall. In case of fire the joist quickly burns through, and, in falling, the metal strap cannot free itself from the wall, and either pulls the wall along, as shown in Fig. 1, or else makes a breach, so fire can pass through to the next building. In addition to this, defective flues ignite the joist ends, and careless builders sometimes permit joists to overlap each other when resting on a party wall.

The Goetz-Mitchell method of anchoring joists is designed to obviate these serious defects. The falling joists free the anchorage and leave the walls standing. By the ventilation provided at the sides, it also prevents the rotting of the ends of the joists. A greater weight upon the beam increases the bondage of this anchor. This joist anchor (see Fig. 2) consists of a dovetail form cast iron box, which is built into the wall, its form securely holding it in position. A notch on the bottom edge of the joist fits over a lug in the box, and thereby forms the tie between the opposite

An architect's aim should be to so construct his building that the entire interior of the structure might be destroyed, but without damage to the exterior walls. The Goetz-Mitchell methods are designed to accomplish this; for should the joist upon one side of a building burn and fall, then those upon the other side

Street, for the sale of their Spence hot water heaters. Their sales have greatly increased during the past year, and they will have to provide increased facilities for manufacturing for next season.

MESSRS. GUMMEY, SPERING & Co., of Philadelphia, importers of standard brands of tin plate, issued a very neat and artistic catalogue with the advent of the new year, designed to afford, at the opening of each month, a pleasant reminder to their customers of the enterprise of the firm and the sterling worth of their goods. The firm also carry in stock tinners' supplies of all kinds, corrugated galvanized iron, spiral pipe, stamped ware, tools and machines, etc.

### IMPROVED BLIND SLAT PLANING MACHINE.

Any kind of a machine for the working of wood cannot be too much improved, for then the mechanism is so much more capable of producing the best of work in the largest quantity. The Egan Co. has just introduced a novelty, which we show in the accompanying illustration—a four-sided blind slat planing machine, for planing all kinds of blind slats on all four sides at one operation. It is new in design and construction, and will not tear out or chip on cross-grained stuff, but makes a smooth slat, free from any wave or breaking out of edges. The side cutters can be run as long as the plain bits without sharpening, which has not heretofore been accomplished on any other machine.

The machine can also be used for all kinds of light mouldings, window stops, weather strips and work of

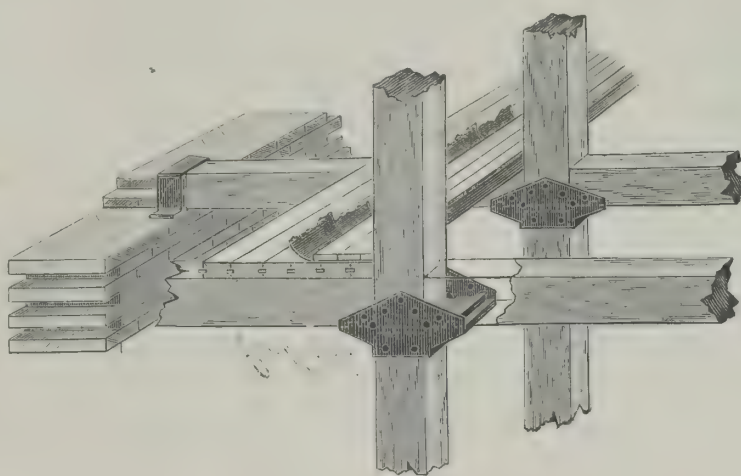
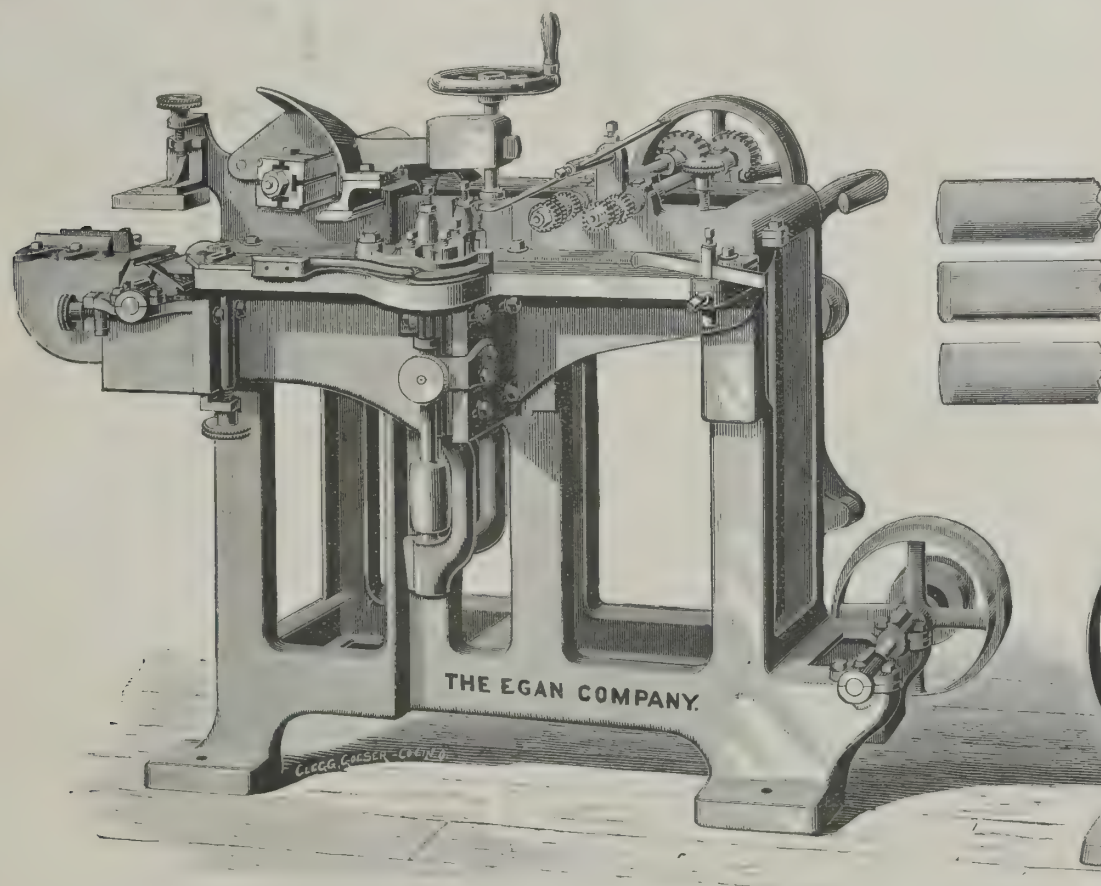


Fig. 5.

would be holding the wall in position (see Fig. 4). The main object of the method is to keep the fire and partition walls erect during a fire, for nothing can resist the spread of fire so well as a standing brick wall.

Fig. 5 illustrates another improvement in the way of a timber cap arranged so that any burnt or defective parts can fall out of their respective positions, but without bringing down adjacent parts. The advantages are, they are easily put up, prevent crushing of



### IMPROVED BLIND SLAT PLANING MACHINE.

walls. In case of fire, the joists, in falling, free themselves from the lug and have no tendency to pull the walls down. When used on every fifth joist the method costs no more than the old style strap and star. The device can be arranged for iron beams, forming a secure anchorage and also a safe bed plate.

Fig. 3 shows the anchor arranged with air spaces at

timbers when loaded, and prevent vibration of building, because the bases of columns are securely fastened. They save 12 inches in length on the long lengths of timbers, and all parts are securely held together, and still any horizontal timber can fall without damage to the sustaining posts. The cap being bolted to the upper column will carry the horizontal timbers, should the

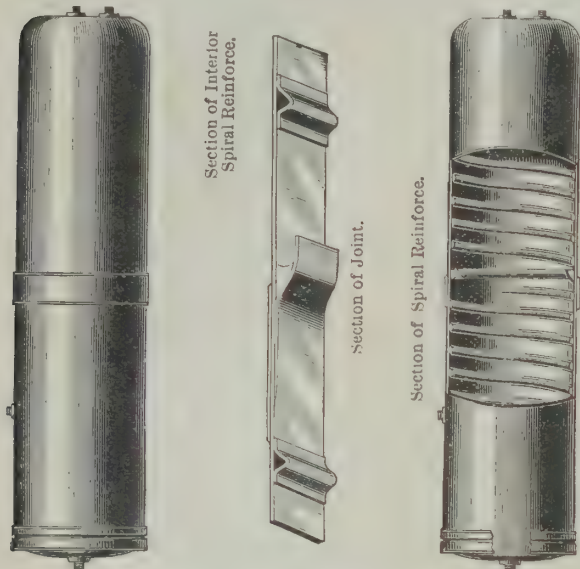
that class, making it a very desirable machine for all kinds of mill and general work. It has two changes of feed, and is furnished complete with a full set of bits for each head.

For further information address the originators and builders, the Egan Company, Nos. 209 to 229 West Front Street, Cincinnati, Ohio, U. S. A.



## SEAMLESS COPPER HOUSE BOILER.

The house or kitchen range boiler which we illustrate has been in use for a number of years, giving the best of satisfaction. The illustrations show the complete boiler, section of interior re-enforced, and enlarged section of joint. The two shells forming the head and sides of the boiler are in one piece and without seam, drawn from circles of copper, and are from one-eighth to three-sixteenths of an inch thick. The sides are elongated by reducing the thickness, while the head, where the most strength is needed, remains the same thickness as the original circle. The shells are cold-drawn, which largely increases the tensile strength of the copper. The only joint is in the center.



BROWN'S PATENT HOUSE BOILER.

The two shells are telescoped and further secured by a band of heavy copper shrunk on the outside, the whole thoroughly sweated together with solder, forming a perfect seam, much stronger than the ultimate strength of the boiler. The strong spiral support which runs the entire length of the interior gives security from collapse under any condition. The inside is thoroughly and heavily turned, and each boiler is subjected to inspection and test before shipment, regular pressure being tested to 200 and extra heavy pressure to 300 pounds per square inch. A new brace has been devised which will hold the two shells more rigidly and firmly together, and this is used when higher pressure is desired than ordinarily required.

Messrs. Randolph & Clowes, of Waterbury, Conn., are the manufacturers, and will forward a fully illustrated circular on application.

## BEST QUALITY ROOFING TIN PLATE.

Absolutely the highest rank has always been the standard claimed by James B. Scott & Co., Pittsburgh, Pa., for the guaranteed brands of roofing tin plate which they have been importing for many years. The success attained for their "Scott's Extra Coated" brand has been a practical indorsement of its superior

SCOTT'S  
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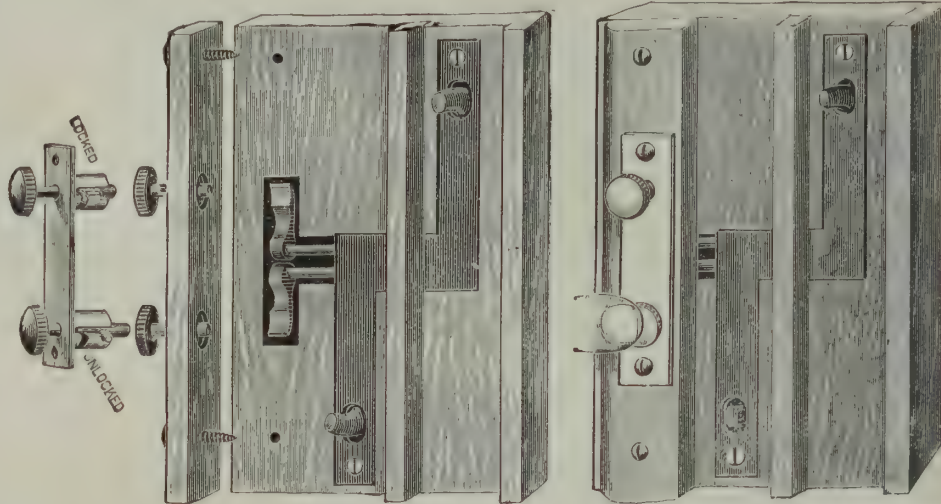
qualities, for it has been selected for many large and important buildings throughout the country. It was used for roofing the new Pension building in Washington, D. C., and Gen. Meigs, U. S. Supervising Architect and Engineer of the Pension building, has written a letter expressing perfect satisfaction with its quality. This brand of tin was also selected for the large Union Depot in Chicago, the Grand Central Depot in Cincinnati and the Board of Trade building in Louisville, the latter now under course of construction. As a ready means of

SCOTT'S  
EXTRA COATED

identification and likewise as security against imposition, each sheet is stamped with brand name and gauge mark designating thickness. The brand name, "Scott's Extra Coated," being registered, cannot be used by others, and as "No Waster" or imperfect sheets of the "Scott's Extra Coated" are allowed to reach this country, full protection is guaranteed.

## A BURGLAR PROOF SASH LOCK.

The accompanying illustrations represent a sash lock by means of which the sash may be locked in any desired position, giving absolute security and at the same time affording ventilation as needed. These locks are adapted for application to any window, whether made to operate with or without weights, and they can be readily fitted to the windows of old or new houses. The bolt in either or both sashes can be locked back by pressing down on the buttons and turning slightly to the right, when the sash are securely locked and cannot be opened from the outside. These locks are made by the I. G. Jenkins Manufacturing Co., of Oswego, N. Y., and their simplicity, strength, automatic action, and the facility they afford for obtaining perfect ventilation, have brought them into high favor among architects and builders.



Bolt pressed back, releasing the upper sash.

BURGLAR PROOF SASH LOCK.

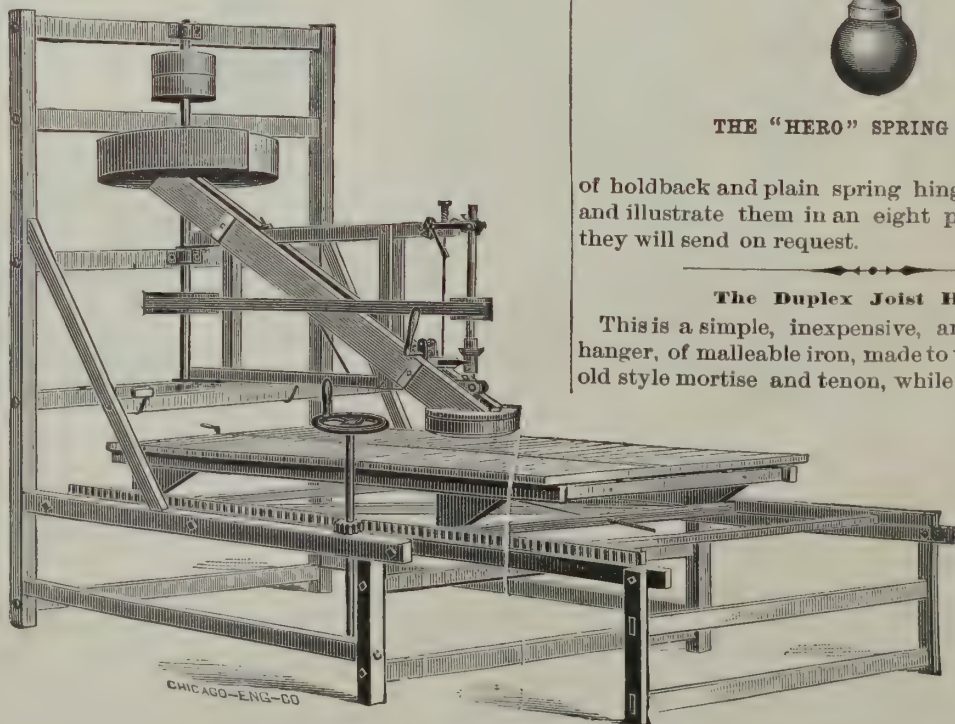
## Blower Engines of the Galena.

The steam engineering department of the Brooklyn Navy Yard recently tested two blower engines received from the Buffalo Forge Co., Buffalo, N. Y. The two blowers, if satisfactory, are to be fitted to the corvette Galena. They will supply forced draught to the furnaces, a plan that makes marine boilers about as rapid steam makers as the boilers of railroad locomotives. The government test requires that the blowers shall develop 10,000 cubic feet of air on an air pressure of two inches of water. The blowers came up to the requirements in 575 revolutions per minute. The contract provides that the blowers shall be able to make 800 revolutions per minute. They demonstrated this ability. The contract further requires that during the seven hours' test the oil cups shall not require refilling. The draught furnished during the test showed a velocity of 70 miles per hour. An electric counter, the invention of Passed Assistant Engineer Weaver, was in use to measure the number of revolutions. The use of forced draught aboard the Galena will enable the corvette to maintain her steaming efficiency on a less number of boilers.

The line of fans manufactured by the Buffalo Forge Co. includes those of all sizes, types and capabilities for every kind of service. The large amount of "fan" work placed by them upon various boats shows a wide variety of engine designs, both horizontal and vertical, single and double. The construction is necessarily of high order of merit, that they may successfully operate under continuous service.

## AN EFFICIENT SANDPAPERING MACHINE.

The machine shown in the illustration works rapidly, requires but little power, is readily adjustable, and very simple in all its parts. It has come into large use in the leading woodworking factories in the United States, and is especially adapted for service in the manufacture of furniture, sash, blinds, and doors, carriages, wagons, and agricultural implements, and for

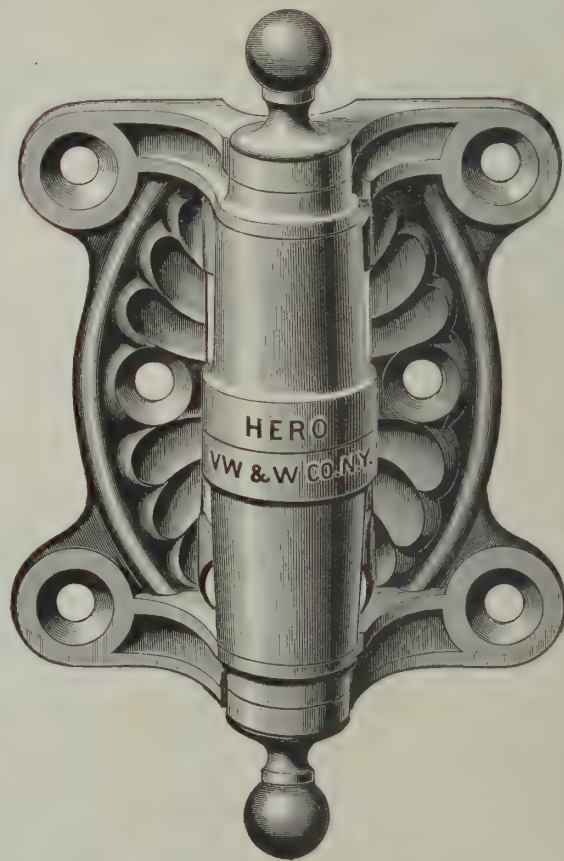


THE "EUREKA" SANDPAPERING MACHINE.

smoothing and polishing plain wood surfaces generally. The upright mandrel with the head carrying the sandpaper turns in adjustable boxes fastened to a swinging crane, the mandrel being adapted to tilt to the right or left as required, for setting the head to correspond

## THE "HERO" SPRING HINGE.

Van Wagoner & Williams Co., of New York City, are putting on the market for this season a new spring hinge, the "Hero," No. 6, of the holdback variety, as illustrated herewith. It is claimed for this hinge that it is neat in appearance, easily applied, and is stronger than any other hinge of this class in the market. Besides the Hero, they manufacture several other styles



THE "HERO" SPRING HINGE.

of holdback and plain spring hinges for screen doors, and illustrate them in an eight page circular, which they will send on request.

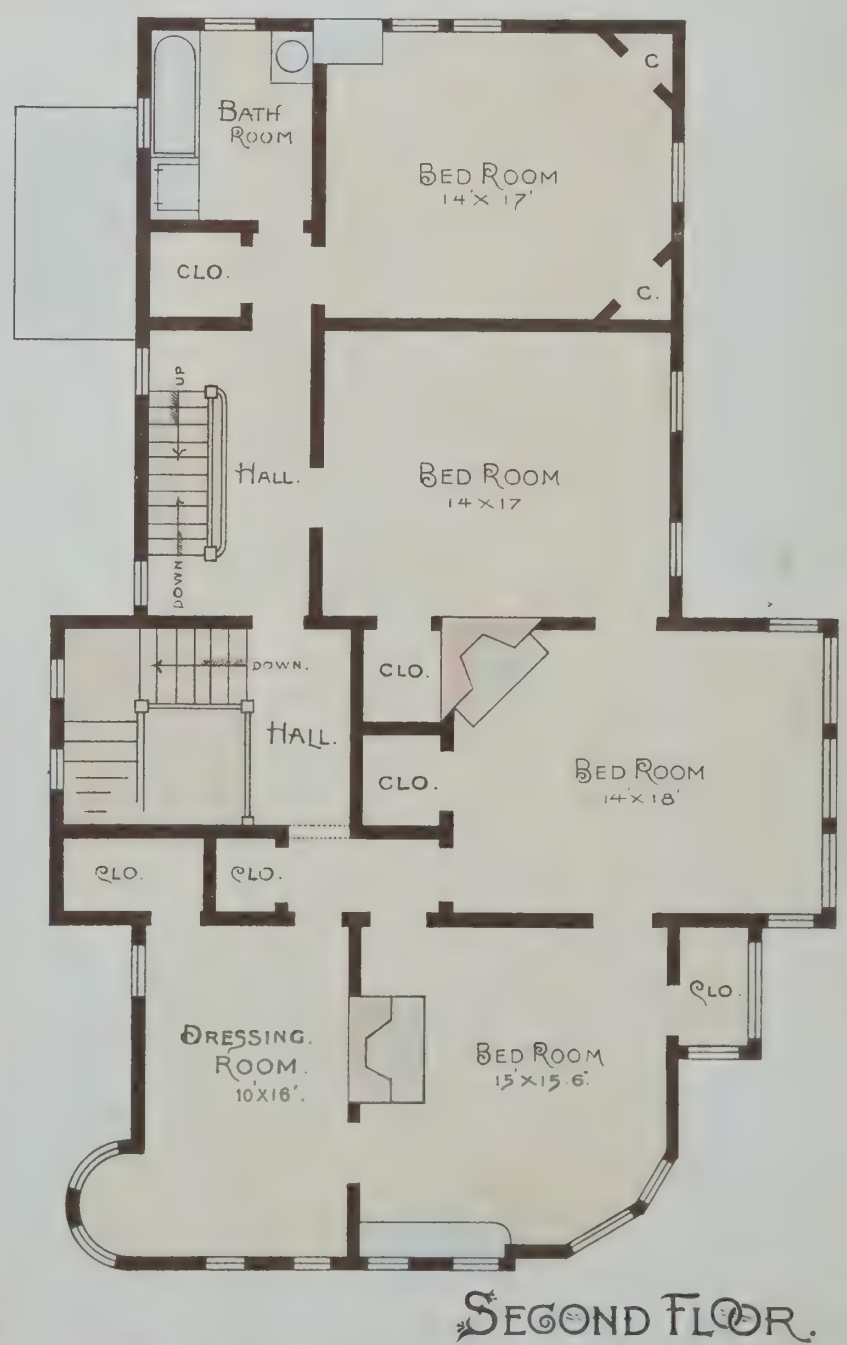
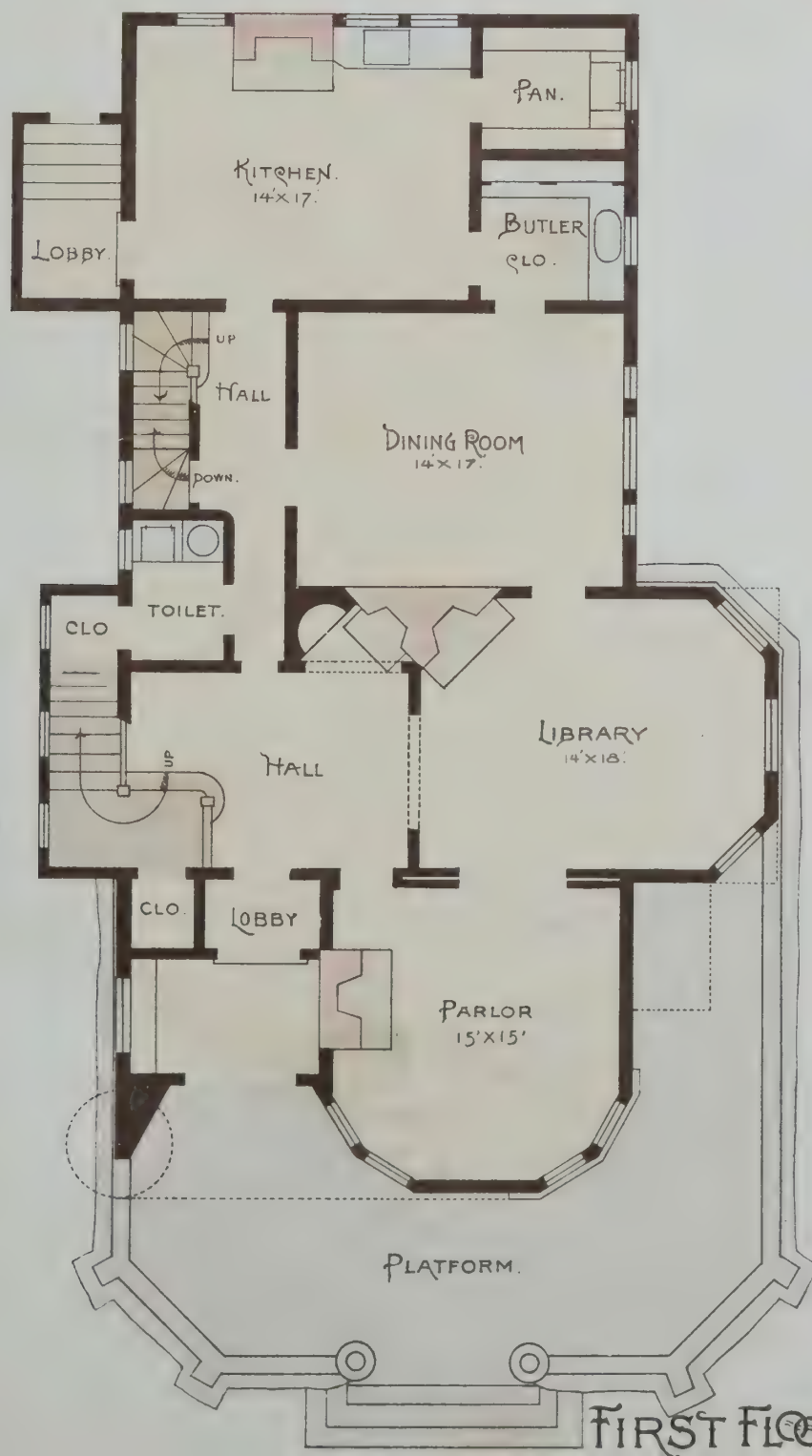
## The Duplex Joist Hanger.

This is a simple, inexpensive, and very serviceable hanger, of malleable iron, made to take the place of the old style mortise and tenon, while affording a stirrup for the same cost. It is especially adapted for chimney, stair, light well, elevator, and other openings, and for use with cellar beams, ceiling joists, and roof trusses, etc. It is made by the Duplex Hanger Company, of Cleveland, Ohio.





A RESIDENCE AT BRIDGEPORT CONN.









# SCIENTIFIC AMERICAN

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No. 4.



A RESIDENCE AT BRIDGEPORT, CONN.

[See colored plate, also page 52.]



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A. E. BEACH.

NEW YORK, APRIL, 1891.

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This is a Special Edition of THE SCIENTIFIC AMERICAN, issued monthly. Each number contains about forty large quarto pages, forming, practically, a large and splendid Magazine of Architecture, richly adorned with elegant plates in colors and with fine engravings; illustrating the most interesting examples of modern Architectural Construction and allied subjects.

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No other building paper contains so many plans, details, and specifications regularly presented as the SCIENTIFIC AMERICAN. Hundreds of dwellings have already been erected on the various plans we have issued, and many others are in process of construction.

All who contemplate building or improving homes, or erecting structures of any kind, have before them in this work an almost endless series of the latest and best examples from which to make selections, thus saving time and money.

Many other subjects, including Sewerage, Piping, Lighting, Warming, Ventilating, Decorating, Laying Out of Grounds, etc., are illustrated. An extensive Compendium of Manufacturers' Announcements is also given, in which the most reliable and approved Building Materials, Goods, Machines, Tools, and Appliances are described and illustrated, with addresses of the makers, etc.

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Of the April number of the ARCHITECTS AND BUILDERS EDITION  
of SCIENTIFIC AMERICAN.

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### A COTTAGE ON LOMBARD AVENUE, CHICAGO.

We publish this month two floor plans and a colored photographic view, taken specially for the SCIENTIFIC AMERICAN, of the above cottage, No. 216 Lombard Avenue. The entrance to the main hall is from a veranda 4' 8" from the grade line. The hall has also a fireplace. The parlor is 12 x 14, has large bay window extending across the whole width of the room, also a side window. It has direct entrance from the hall and connects by sliding doors with the dining room. The dining room is 12' x 12', is well lighted by mullioned windows with rear aspect, also side window. It connects with the hall, kitchen and parlor. The kitchen is 12 x 13 and is fitted with large range, sink, and all modern conveniences, and communicates with the hall and dining room direct, also with rear porch. The second story contains four bed chambers with convenient closet room. There is an oaken staircase with handsome newel and turned balusters. The house is cellared, and the basement story is built of stone, the first and second stories being frame, covered with clapboards, and the roof shingled. The house is pleasantly situated, about six miles from the city, and is estimated to cost \$2,800.

### A RESIDENCE AT BRIDGEPORT, CONN.

One of our colored plates presented with this issue illustrates an attractive residence erected for Mr. Albert Stanton at Bridgeport, Connecticut. Two additional photographic elevations will be found on page 51. Dimensions: Front, 38'; side, 60', exclusive of platform. Height of ceilings: cellar, 7' 6"; first story, 9' 6"; second, 9'; third, 8'. Underpinning and balustrade to front platform are built of "rock-faced" stone, from the North Bridgeport quarries. The superstructure above, of wood, is covered with shingles and painted stone gray with tile red trimmings. Roof is covered with octagonal cut slate, from the Bangor quarries. The plan shows large rooms; they are handsomely finished and fitted up in a most convenient manner. The interior throughout is trimmed with whitewood. The doors and windows have beaded casings and corner blocks. Hall, parlor and library are stained and finished in cherry. The broad staircase with ornamental newels, the nook with paneled divan and fireplace are the features of the hall, while the parlor and library are connected by sliding doors, and furnished with open fireplaces, built of brick, with hearth laid with same in red mortar, and carved bric-a-brac mantels with mirrors. Dining room is stained and finished in antique oak; the transom over casement is glazed with stained glass. Rear hall and stairs are conveniently located and form access to kitchen from front hall. Kitchen and pantries are trimmed and wainscoted with yellow pine, and are fitted up in the best manner. There are four bed rooms, dressing room and bath on second floor. The woodwork on this floor is finished natural. Fireplaces built of brick have neat mantels. Bath room is wainscoted. Three bedrooms on third floor. Cemented cellar contains laundry, furnace, and other apartments complete. Cost \$6,900 complete. A similar house was erected at Providence, R. I., for \$5,380 complete, by substituting shingles for stone balustrade with equal effect. Howard Hoppin, Providence, R. I., architect.

Our colored plate and the two other engravings were made direct from photographs of the building taken specially for the SCIENTIFIC AMERICAN.

### A COTTAGE OF MODERATE COST.

On pages 54 and 55 we present three elevations and plans of a convenient and attractive cottage erected for Mr. R. H. Keller, at Rutherford, N. J.

Dimensions: Front, 26 ft. 6 in.; side, 32 ft. 6 in., exclusive of piazza. Height of ceilings: cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Foundation, stone. Underpinning, brick. First story clapboarded and painted bottle green, with trimmings of a darker shade. Second story shingled, painted a tile red. Roof shingled, painted red. The interior is trimmed with whitewood. Hall spacious, contains an ornamental staircase, turned out of ash. Parlor is stained and finished in cherry and dining room in antique oak, the latter provided with an open fireplace, built of brick, with hearth laid with same. The principal rooms have ornamental mantels, with mirrors. The floors throughout are of yellow pine, laid in narrow widths. Kitchens and pantries are trimmed and wainscoted with yellow pine (finished natural), and are replete in all their appointments. Second floor contains three bed rooms, den and bath room, all trimmed with whitewood, finished natural. One bed room and storage in attic. Cemented cellar, contains laundry and furnace. Cost \$2,700 complete. Mr. U. D. Peck, architect, same place.

Our engravings were made direct from photographs of the building taken especially for the SCIENTIFIC AMERICAN.

### A COTTAGE AT AUSTIN, CHICAGO.

On page 56 we publish two floor plans and a photographic view of Mr. E. M. Bowes' cottage at Waller Avenue, Austin, Chicago, which stands in its own grounds, surrounded by a lawn, and is situated about

six miles from the center of Chicago. The house is cellared throughout, the basement being of stone 18 in. thick. First and second stories are frame, covered with clapboards, and the roof is shingled. There is a large porch to the front door, which extends half way across the front of the house, and which also serves as a veranda, at a height of 5 ft. 3 in. from the grade line. The parlor is 12 by 14, with open fireplace, and connects with the hall, also by a portiere with the dining room. The dining room is 12 ft. by 15 ft., has an open fireplace, a large bay window, and is entered either from the library or kitchen. The library is 12 ft. by 12 ft., and enters direct on to the hall, also connects with the kitchen. It has an open fireplace and a large bay window extending the full width of the room. The kitchen is 10 ft. 6 in. by 12 ft., and is fitted with range, sink, etc., and is entered either from the library or dining room or direct from rear porch. The second story contains five good chambers, with closets, also toilet room with bath, water closet, etc. The whole makes a very comfortable residence, and is estimated to cost \$3,300.

### NEW DWELLINGS, NEW YORK CITY.

We give on page 58 some new houses erected for John Du Fais, Esq., on West 82d Street, New York City. Height of ceilings: Cellar, 7 feet; basement, 8 feet 6 inches; first story, 11 feet; second, 10 feet; third, 9 feet 6 inches; fourth, 9 feet. The exterior wall up to second story is built of dark red freestone, natural rock dressed, and the superstructure above is built up with "Dutch" pressed brick. Roof is covered with red English tiles. Windows glazed with French plate glass. Lobby has a tiled floor. Hall and foyer hall are trimmed with antique oak; the latter furnished with a "Dutch" fireplace, with hearth and facing of brick, and an elegant staircase with carved newels and post running to ceiling. Parlor is finished in the Renaissance style, with china gloss and gilt. The fireplace and mantel are a marvel of beauty. The facings and hearth are laid with white tiles, and the mantel is elegantly carved, with beveled mirrors, etc. Dining room is trimmed with antique oak and is finished in old English style. It contains a brick fireplace, with hearth and facings of tiles and a very handsome mantel, with numerous little closets, furnished with ornamental glass doors. Opposite fireplace there are two china closets, with an arch thrown between, supported on two oaken columns. Butler's pantry is trimmed with ash, and contains butler's bowl, closets, with sliding glass doors, and dumb waiter. The second, third and fourth floors are trimmed with cherry. The fireplaces are fitted up similar to the ones already described. Bath room is wainscoted with white "English" tiling five feet high, and paved with unglazed tiles. It is furnished with an enameled bath tub and marble basin, with all plumbing exposed. Fourth floor contains four bed rooms and trunk room. Basement is trimmed with ash, and contains billiard room, kitchen and pantries. Kitchen is wainscoted with white enameled brick. Cemented cellar contains furnace and other apartments. Cost of each house, \$20,000 complete. Messrs. Berg & Clark, New York, architects.

Our engraving was made directly from a photograph of the buildings taken specially for the SCIENTIFIC AMERICAN.

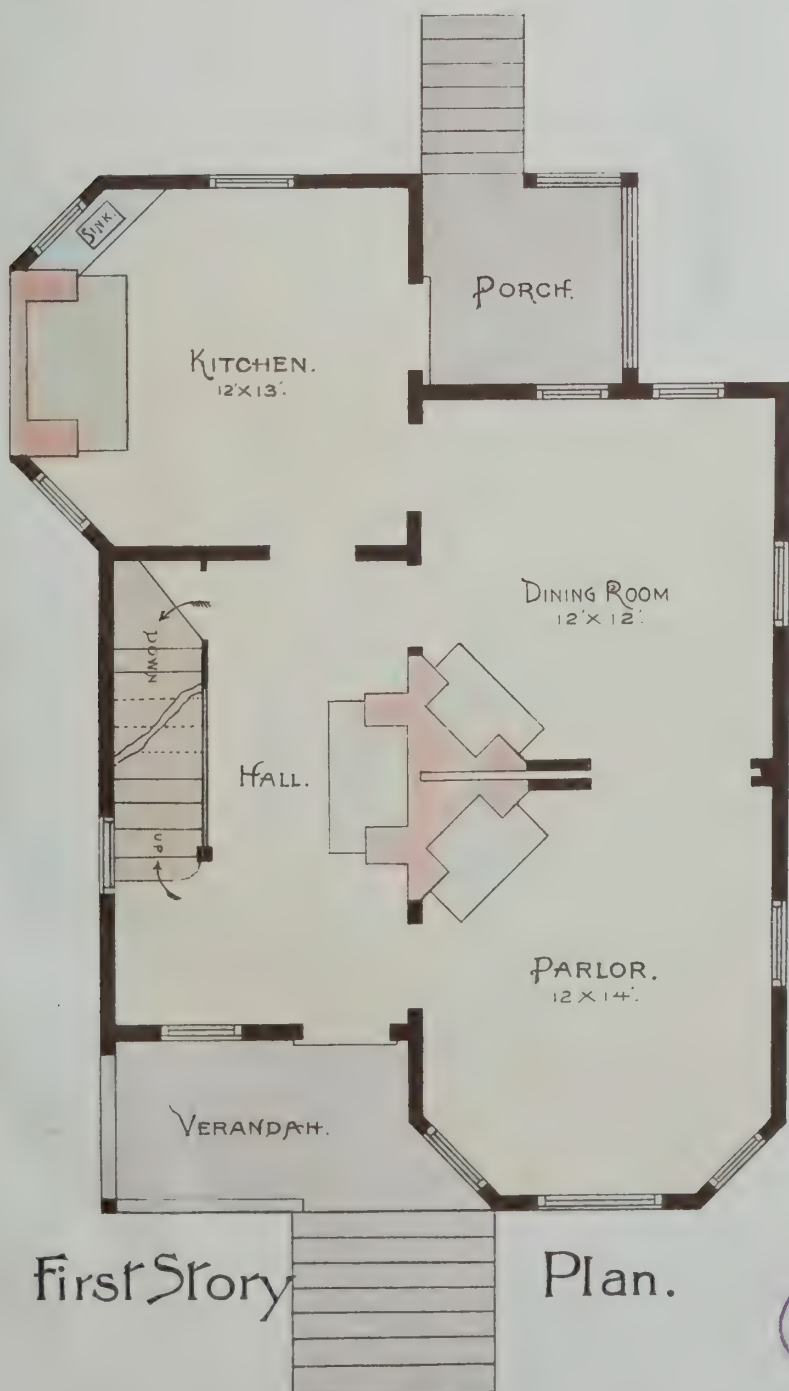
### A COTTAGE AT NEW HAVEN, CONN.

We present, on page 59, an attractive cottage recently erected for Mr. S. T. Dutton at New Haven, Connecticut. D. R. Brown, same place, architect. Dimensions: Front 34 ft. 3 in., side 43 ft. 6 in., exclusive of piazza. Height of ceilings—cellar 7 ft., first story 9 ft. 6 in., second 9 ft., third 9 ft. Underpinning of dark red sandstone. The superstructure above is of wood, shingled and stained dark sienna. Roof shingled, painted tile red. Hall, entered from a vestibule, is spacious and inviting, and is trimmed with ash. The work is separated by hard wood columns, running to ceiling, between which are spindle transoms. The staircase is very unique. It has an oriel bay at first landing, that rises into a tower. This staircase has carved newels and spindle balusters, and is lighted by stained glass windows. Parlor and dining rooms are trimmed with ash, and each has open fireplace, furnished with tiled hearths and facings and elegant carved mantels with beveled plate mirrors, etc. Butler's pantry, 5 ft. by 8 ft., is properly fitted up with cupboards, drawers and bowl. Kitchens and pantries are trimmed and wainscoted with North Carolina pine, and are fitted up in a most replete manner. Back stairs to second story are private, and beneath these stairs to cellar descend. Second floor contains four bed rooms, large closets and bath room. The woodwork in these apartments is treated in delicate colors. The bath room is wainscoted and contains tub, bowl and closet. The plumbing is of the best description. There are three large bed rooms on third floor, besides ample storage room. Cemented cellar, contains furnace, laundry, and other apartments. The cost was \$6,850 complete, and the contracts were as follows: Mason work, \$1,400; joiners' work, \$5,000; plumbers' work, \$450. Total, \$6,850. Our engraving was made





A COTTAGE ON LOMBARD AVE. (CHICAGO).



First Story Plan.



Second Story Plan.









direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### A DWELLING AT YONKERS, NEW YORK.

Our illustration, page 61, represents an attractive dwelling erected for Mr. Eagan Logan at Yonkers, New York, at a cost of \$6,000. Dimensions: Front 26 ft. 6 in., side 39 ft. 6 in., not including piazza. Height of ceilings—cellar 7 ft., first story 9 ft. 6 in., second story 9 ft. The foundation is built of stone, and the underpinning of brick, the latter laid in red mortar. The building throughout is covered with shingles, painted olive green. The roof is shingled and painted red. There is a cemented cellar under whole of building, containing laundry and furnace. The interior is finished in a very pretty manner, and it contains all the necessary improvements, etc. The doors and windows have beaded casings and carved angle blocks. The trim throughout is of cherry, finished in hard oil, with the exception of kitchen and pantries, which are trimmed with North Carolina pine. The fireplaces have tiled hearths and handsome hard wood (cherry) mantels. There are three bed rooms, large closets and bath room on second floor, and two rooms in attic. The ceilings of the principal rooms are corniced and center pieces are provided. Mr. Silliman, of Yonkers, architect.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### RESIDENCE ON RIVERSIDE PARK, NEW YORK CITY.

In our last number (March) we presented a colored plate illustrating the beautiful residence of Mr. Noakes, on the above park, and promised to give additional views. These we now present. They will be found on page 62. Both are from photographs of the building specially taken for the SCIENTIFIC AMERICAN. This is a very attractive dwelling, built in stone. The design is such that, with a few modifications, it might be advantageously reproduced in wood.

#### How to Catch Contracts.

When a customer calls to talk house to an architect or builder, one of the readiest means to inform and interest him is to show the various numbers of the SCIENTIFIC AMERICAN. These are replete with photographic pictures of new and tasteful dwellings and plans. Our customer looks at this one, and that, until he finds a plan that nearly suits his fancy, except that the kitchen is not just as he could wish, or the hallway, or that closet, or "I should like it better if a dormer window were there." or some other minor change were made. To which the builder frankly replies that he understands his wishes to a dot, and will be glad to make up a plan for him; will have it ready to-morrow; and, moreover, "It shan't cost you a penny."

This liberal and agreeable treatment is highly appreciated by the customer. After his departure our architect or builder whips out his tracing paper, follows the plan selected, puts in the few changes suggested, perhaps adds a front elevation of the house, all involving but a short time. The customer, on calling, is delighted. The drawings look like new plans specially made for him; is satisfied this architect or builder is the man for him. His mind is at once made up, and the bargain soon settled and closed. Such, in brief, is the way it works, and we have not related any fairy story. It is the short narrative of hundreds of actual instances. We say to architects and builders everywhere, your interests are sure to be promoted if you keep on hand and make yourselves familiar with the numbers of the SCIENTIFIC AMERICAN, so that you can readily display them to your customers and point them to examples such as they require. There is no other work like it, none that has so wide a circulation among builders, none that does them so much practical and financial benefit. It assists to educate customers up to the point of having good houses, and it does this quickly, for it employs the most effective of all means for rapid education, namely, the *attractive and truthful picture*. Nearly all the illustrations given are photographic plates made from the buildings showing all the minute details. These plates are specially prepared for the SCIENTIFIC AMERICAN. Every number presents a new and fresh supply. They are not fancy sketches, but genuine photo. plates of the objects they purport to illustrate. You cannot do a better thing for yourself than to subscribe for this paper. You cannot do a better thing for your fellow architects and builders and for your neighbors than to urge them to subscribe.

The circulation of the SCIENTIFIC AMERICAN stimulates and promotes the building of new and improved houses. We know of towns where every builder is a subscriber and all are full of business. People who see illustrations of handsome buildings are greatly influenced thereby. A notable improvement in architecture takes place in all towns and villages where the SCIENTIFIC AMERICAN freely circulates. Improved architecture increases the value of property. This is a self-evident proposition. Therefore, do all you

can to boom this important and most useful periodical.

The January number began a new year. Now is the time to renew your own subscription and to add another for your friend. Can you think of a better present for him?

#### TOGGLE BOLT FOR ELECTRICAL AND OTHER FIXTURES.

The accompanying cut shows an ingenious little device for overcoming certain difficulties that are met in attaching to brick or stone walls, tiles, etc. It is put on the market by the Electrical Supply Company, of Chicago. Where the obstruction is comparatively thin, as in the case of tiles or a single layer of bricks, a hole is drilled through and the bolt pushed in until the arm drops down inside at right angles to the bolt, effectually preventing its withdrawal. It is often necessary, however, to attach to a solid, thick wall, and in such cases the drilled opening is enlarged, as in the cut. The sharp corners of the arm fasten to the jagged surface of the opening, and as the nut is set, the arm wedges tightly between top and bottom. The toggle bolts are made in two sizes,  $3\frac{1}{2}$  and  $4\frac{1}{2}$  inches.



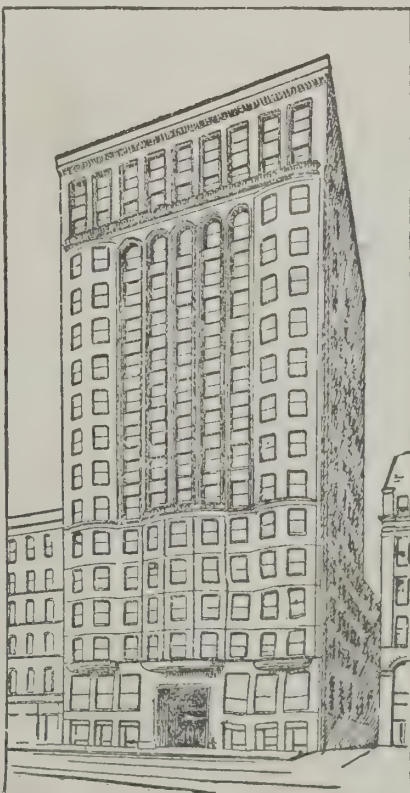
#### TOGGLE BOLT FOR WALL FIXTURES.

ally preventing its withdrawal. It is often necessary, however, to attach to a solid, thick wall, and in such cases the drilled opening is enlarged, as in the cut. The sharp corners of the arm fasten to the jagged surface of the opening, and as the nut is set, the arm wedges tightly between top and bottom. The toggle bolts are made in two sizes,  $3\frac{1}{2}$  and  $4\frac{1}{2}$  inches.

#### A SIXTEEN STORY OFFICE BUILDING.

Plans for a Dearborn Street office building, Chicago, to outrank anything on a street famous for high buildings, have been completed. Some time ago the Columbian Vault Company obtained control of the S. B. Cobb lot on Dearborn Street, under a ninety-nine year lease. On this lot, on the east side of Dearborn Street, at the corner of the alley known as Calhoun Place, a sixteen-story building, to cost \$750,000, is to be erected. The Cobb lot fronts 94.6 feet on Dearborn Street by a depth of 80.3 feet.

The terms of the lease under which the land has been secured are as follows: For the first year the land is to be rent free; for the next two years the annual rental will be \$22,000; during the next three years the



A SIXTEEN STORY STRUCTURE.

annual rental will be \$25,000; and for the balance of the term, \$28,000.

The above cut represents the building which it is proposed to erect on the property. The front elevation has been developed from sketches and suggestions made by the late John W. Root while he lay on his sick bed, and is the last effort of one of America's foremost architects.

While all details of construction have not been decided upon, it is contemplated having the first and second stories of quarry-faced or bush-hammered stone, with an entrance thirty feet wide in the middle. At the north and south limits of the building, but beginning at the third story, will rise two slightly projecting

curved bay windows to be constructed of moulded brick, and climbing upward fourteen stories. At the fourteenth story these bays will end in a gallery running across the front of the building, surmounted by a delicately carved stone railing.

Above this gallery are to be two stories, ending in a handsome terra cotta cornice. In the center of the building and over the main entrance will be a handsome octagonal bay window extending to the sixth story and surmounted by a stone balustrade like that crowning the end bays. The piers to the windows between the end bays from the sixth to the fourteenth story will be either of highly ornamented terra cotta tracery or moulded brick etched in high relief.

The building will be of bridge construction, on the cantilever plan. Only steel and terra cotta or brick or marble will be used. No wood will enter into its construction except for doors and their frames. The floors will be laid in mosaic and the walls lined with white marble. There will be thirty rooms on each floor, of ample size, and well lighted. The building will be ready for occupancy before May 1, 1892.—*Chicago Tribune*.

#### Composition for Retarding the Setting of Plaster.

Edward Watson, of Grand Rapids, Mich., gives the following description:

I take the clean-washed hair as it is prepared for plastering and reduce it to a solution in water by boiling it with an alkali, caustic soda or potash. In practice I use sal soda or soda ash and render it caustic by boiling with enough lime to combine with the carbonic acid, and thus form a solution of caustic alkali. In practice I mix all the materials together—hair, soda or potash, and lime—add water, and boil until the hair is entirely dissolved and a limpid solution is made. After effecting the complete solution of the hair, it may be used in the liquid form and thus mixed with the water in which the plaster is to be mixed, or it may be reduced to a dry mass and finely powdered, and then mixed dry with the dry calcined plaster in proper proportions, so as to be ready for use by mixing with water.

The proportions of material I use in forming the solution of hair are as follows: Hair, one pound; sal soda or soda ash, or an equivalent of potash, one pound; lime, half a pound; water, half a gallon or more. Mix all together and boil until the hair is entirely dissolved. If then desirable to be used in the liquid form, the clear liquid may be strained out and at once mixed with the plaster, or the entire mass may be reduced to a dry powder and then mixed with the dry calcined gypsum either before or at the time of mixing the mortar. This makes an excellent material for restraining the setting of plaster, and has more power pound for pound than any other material I know of. It is freely soluble in cold water and thus intimately mixed with the mortar, and produces uniform results, and appears to render the resulting plaster harder when dry than plaster set without any restraining material.

The quantity of my material to be used with each ton of calcined gypsum will depend upon the time desired to retard the setting of the plaster. It must be estimated by the weight of dry hair used in forming the solution.

One pound of hair treated as described will retard the setting of a ton of calcined gypsum several minutes, and the quantity should be estimated by the time desired to set the plaster. About five pounds to a ton will be all that is required for general use. Too much would so set the plaster back as to in many cases be not practicable.

THE duplex joist hanger, made by the Duplex Hanger Company, of Cleveland, O., is a simple and inexpensive appliance to take the place of the old style mortise and tenon. It provides a safe method for framing headers, trimmers, tail joists, beams, etc., and is especially adapted for chimney, stair, elevator, and other openings. These hangers are made of malleable iron, of a uniform size and shape, and should be readily obtainable without delay from any dealer in builders' materials.

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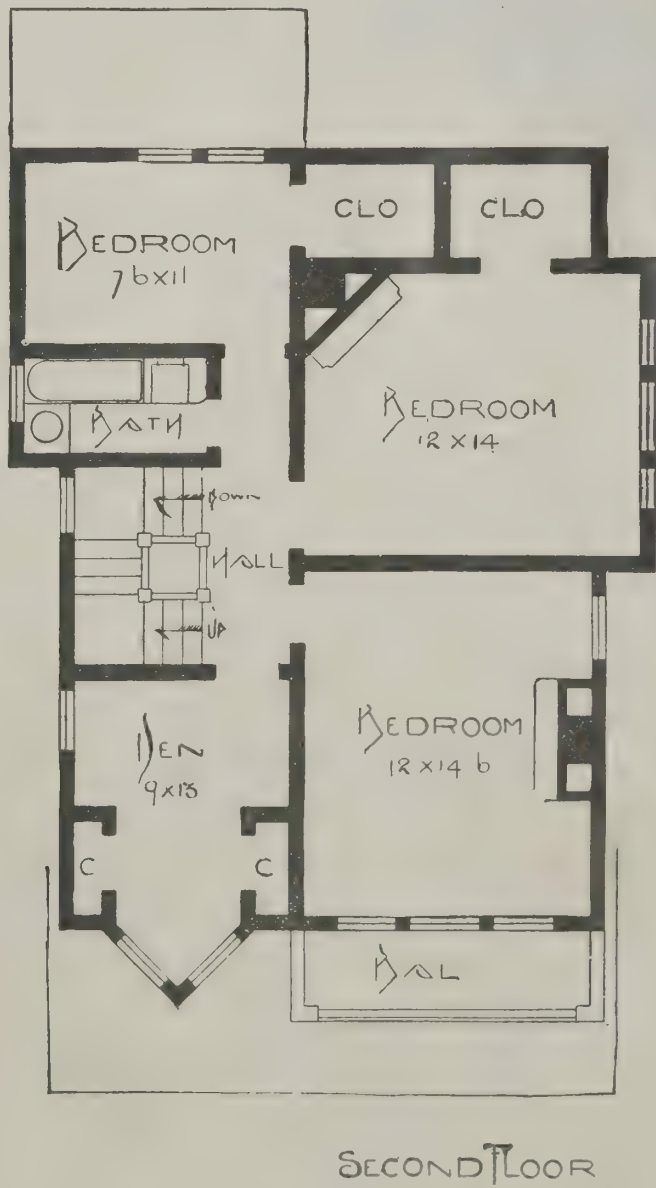
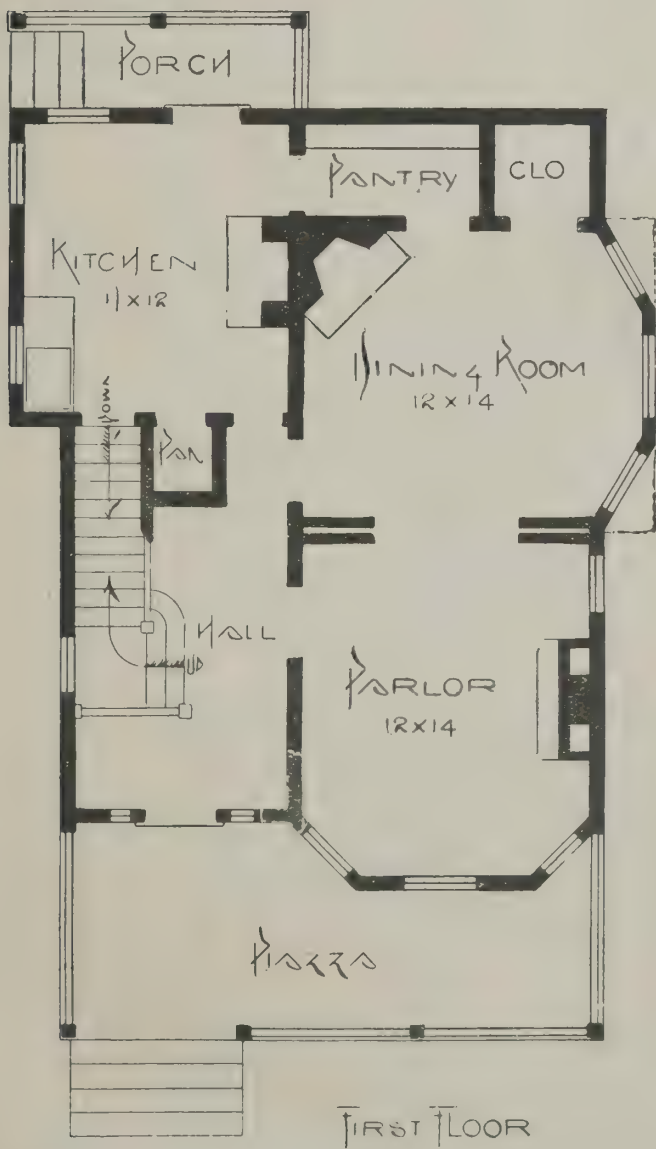
A COTTAGE OF MODERATE COST.



A COTTAGE OF MODERATE COST.

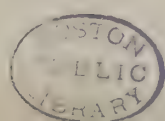
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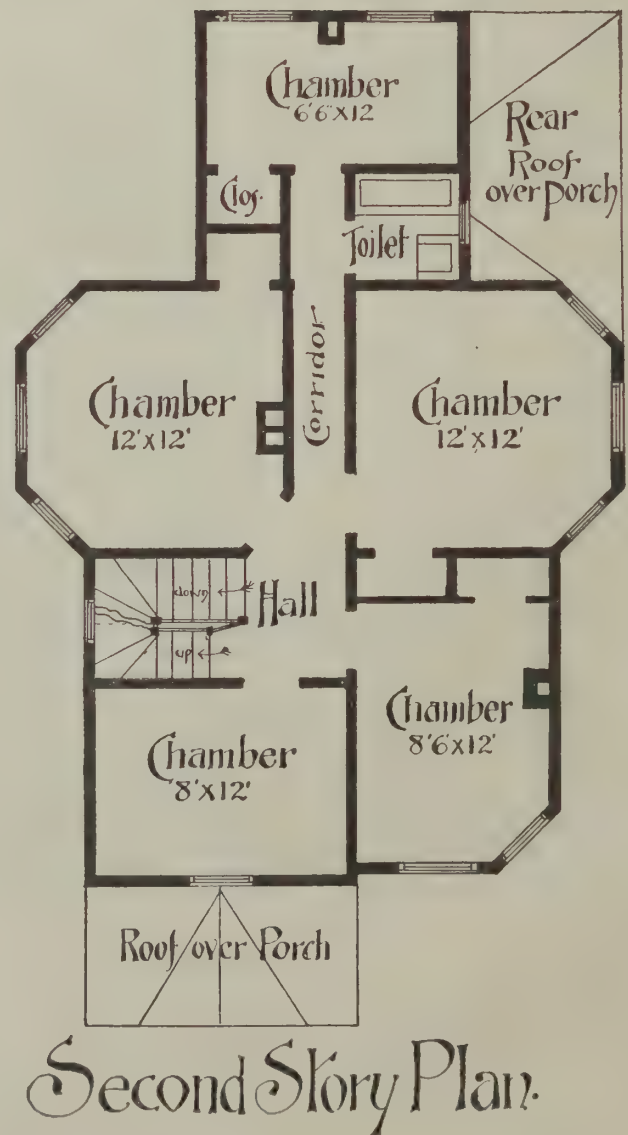


[See page 52]

A COTTAGE OF MODERATE COST.







[See page 52.]

MR. BOWES' COTTAGE, AUSTIN, CHICAGO.



## A COOL SPOT FOR CHICAGO.

The thermometer sometimes takes an amazing flight in Chicago in summer time, and to provide a cool place of retirement on such occasions the following curious structure is proposed. It is the design of William Fitzroy Smith, of Chicago, Ill.

The object is to construct a building the plan whereof is circular, the walls surmounted by a dome, which shall be especially suitable during the summer season for articles demanding a uniform and low temperature—as, for instance, an aquarium with its contents or a horticultural garden; the inside shall be especially agreeable to persons and animals during the summer season by reason of its low and uniform temperature; the outside and inside present a novel and beautiful appearance. It is adapted to form one of several exposition buildings during the fair, while at the same time such building will form a water tower having the necessary stand pipes and machinery whereby water may be forced into such stand pipes in such a manner that the water may be supplied therefrom for fountains and other necessary water supply in and about the fair.

The building may be constructed of any desired size, a structure, for instance, in which the diameter of the circular walls supporting the dome shall be hundreds of feet, the height of such walls extending upward of a hundred feet, and the dome composed of many pieces of iron and glass, and in which the stand pipe shall be of sufficient height and size to supply large quantities of water over a wide area of ground.

The external part of dome is composed of plates of glass, which are set in a frame.

Circular pipes extend around the dome underneath the external surface thereof, and are connected with vertical pipes, so as to receive water from such vertical pipes.

Short pipes extend to the upper surface of the dome, forming openings for the discharge of the contents of the pipes upon the outer surface of the dome.

Structures mounted upon the dome near the center represent the hull of a sailing vessel, or that part of a hull of a sailing vessel above the water line when a sailing vessel is floating upon the water.

There is a vertical pipe and also elevators near the center of the building and elevators near the circular wall of the building.

There is a body of water surrounding the building, from which pipes extend to the pumps. The water will make a circuit up the pipes, out upon the outer surface of the dome, down back to the body of water.

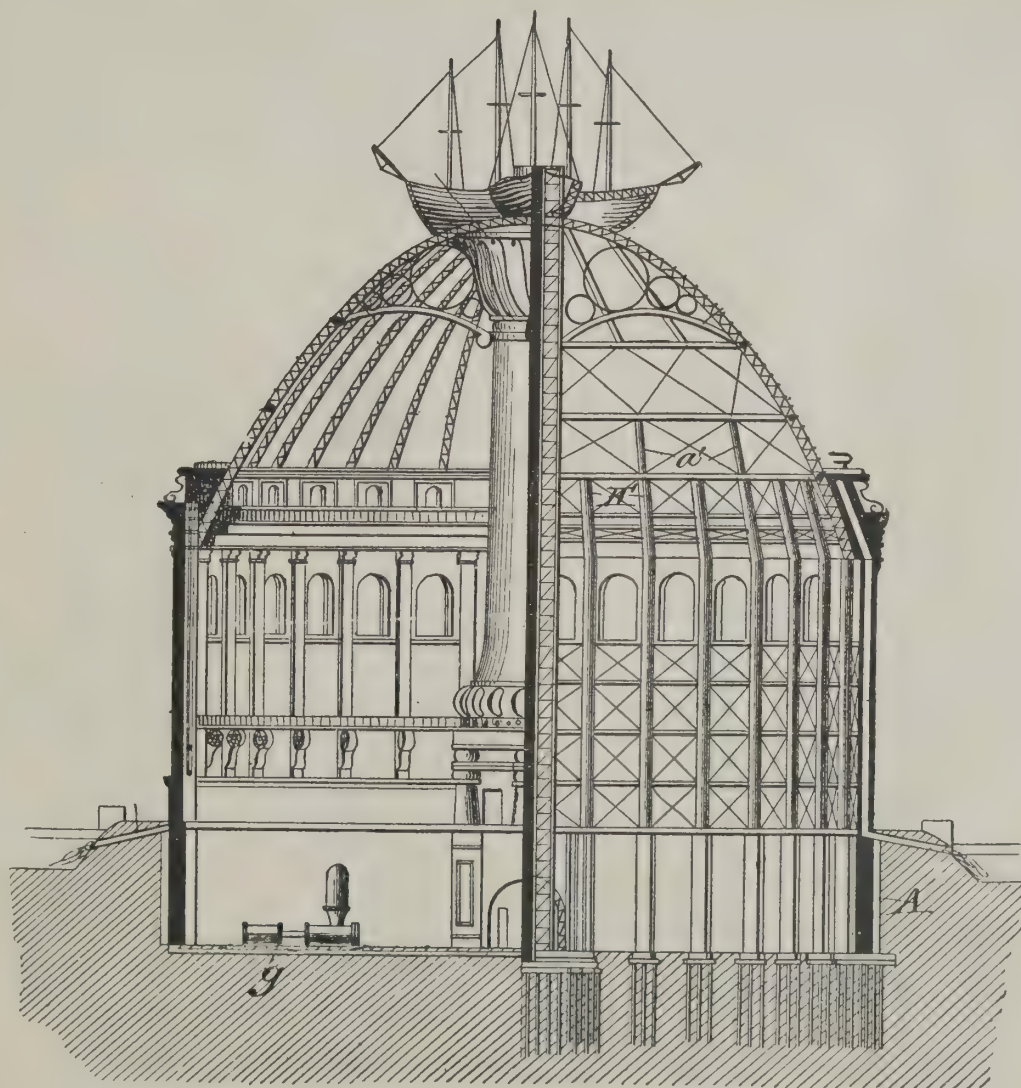
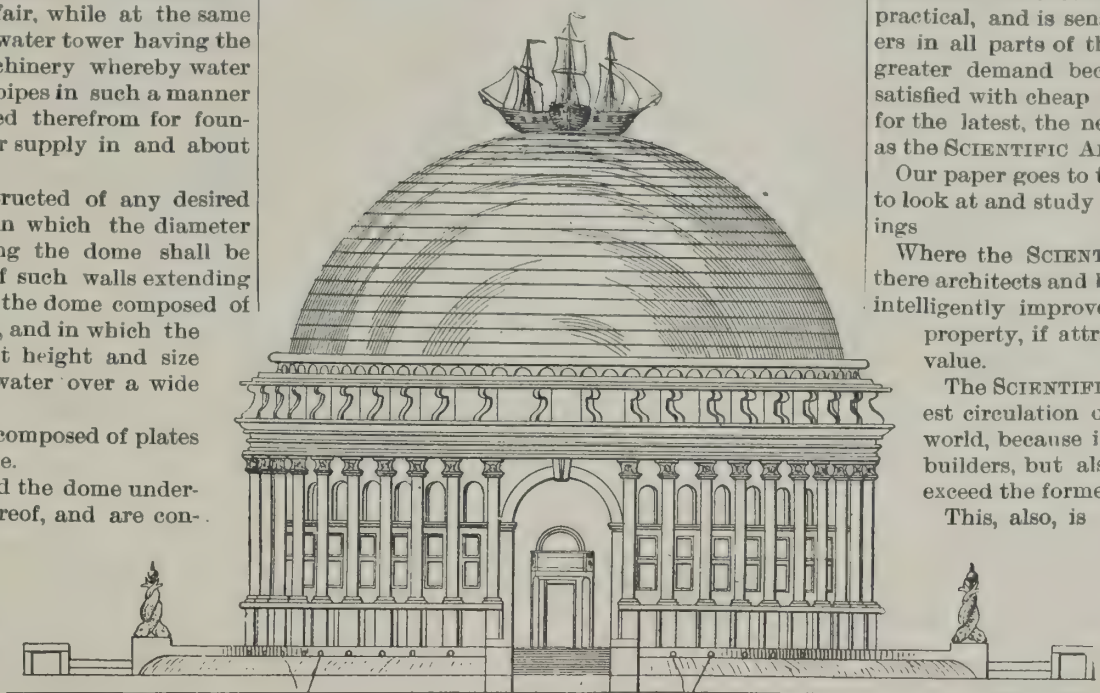
The dome is constructed of glass plates set in the frame, so that water or other liquid upon the outer surface of the dome and flowing over it may be viewed from within the building, and also that the cooling effect of the flowing water may be utilized in lowering the temperature of the interior of the building during the summer season. The dome is water-tight, so that no liquid shall fall within the building.

The above is one of the novelties proposed and patented for the great world's fair at Chicago.

## Quarrying Marble.

Surface marble, unless covered by other rocks, is of little value for some ten to thirty feet, owing to atmospheric influences, and even when this crust is removed the soundness of the marble may not be perfect. Hence in a new region there is some risk in opening a new and untried marble ledge, as its quality cannot be proved with certainty until considerable excavation and development has been done. When this surface cap has been removed, a floor or level space is formed where the channeling machines work. There are two of these worked by steam. One works two gangs of heavy chisels, like the Wardnell machine, and another drives the diamond drills. By these machines narrow parallel grooves or channels are cut across all the floor to a depth of perhaps six feet. The machines are then turned, and channels are cut at right angles with the

first. The floor is thus cut up into blocks of any required size. One of these blocks is called the "key block," and is broken out and the others thus rendered accessible are drilled through at their bases by a process called "gadding," and are then lifted out by cranes. No powder is used except in removing the surface rock, as it shatters the marble too much. The cost of cutting and raising block marble in the Eastern States is from 75 cents to \$1 per cubic foot. When removed from the quarry the blocks are taken to a mill and sawed into slabs, pyramids or blocks by gauges or saws, which consist of strips of soft iron fed with sand and dripping water, the sand supplying the place of teeth to the saw. Polishing is done by machinery. The blocks are placed on a rubbing bed, ground and



A WATER-COOLED BUILDING.

polished with sand, emery and putty, by a rubber which has a rotary to and fro motion.—Stone.

If any of our readers have made an invention for which they have thoughts of taking a patent, they are invited to communicate with Messrs. Munn & Co., the publishers of this paper, who for a period of forty-three years have conducted a most successful bureau in this line. A pamphlet of instructions will be sent free, containing full directions how to obtain a patent, costs, etc. In very many cases, owing to their long experience, they can tell at once whether a patent probably can be obtained; and advice of this kind they are always happy to furnish free of charge. Address Munn & Co., SCIENTIFIC AMERICAN office, New York.

## The Education of Customers.

This country is well supplied with architectural papers, many of them ably conducted, of superior value as instructors of architects, exhibiting the theory, mathematics, principles, practice, rise, and progress of architecture from the earliest ages. The aggregate circulation of these works is quite limited, being confined chiefly to purely professional architects, a comparatively small class, comprising throughout the entire country probably not over three thousand. The SCIENTIFIC AMERICAN occupies quite a different field. It aims principally to educate the customers of architects and builders. This it accomplishes by placing before them a constant succession of fresh and splendid illustrations of attractive buildings and plans. The beneficial influence of this method is very great, very practical, and is sensibly felt by architects and builders in all parts of the country. Their services are in greater demand because their customers, no longer satisfied with cheap and ordinary buildings, now ask for the latest, the newest, and the best designs, such as the SCIENTIFIC AMERICAN brings to them.

Our paper goes to the masses of the people, who love to look at and study the representations of good buildings.

Where the SCIENTIFIC AMERICAN freely circulates, there architects and builders thrive, there property is intelligently improved; and everybody knows that property, if attractively improved, is increased in value.

The SCIENTIFIC AMERICAN has by far the largest circulation of any architectural paper in the world, because it not only goes to architects and builders, but also to their customers, who vastly exceed the former in number.

This, also, is the reason why the SCIENTIFIC AMERICAN has the largest advertising patronage of all the architectural papers. It is these customers who order and pay for the plans, and the buildings, and the plumbing, the painting, the hardware, the walling, the papering, the heating, the lighting, the decorating, the finishing, the furnishing, and every other blessed thing that is used or placed within or without the building. "We get good returns for money spent in the SCIENTIFIC AMERICAN," say advertisers, and that settles the question.

When our builders' edition first appeared, nearly all the architects were down upon it. They said we gave away their plans free to the public, and the effect would be to take bread from their mouths. But they now find, by actual experience, they were mistaken. The SCIENTIFIC AMERICAN promotes their business by educating their customers, and creating a demand for the higher and more profitable class of plans and designs.

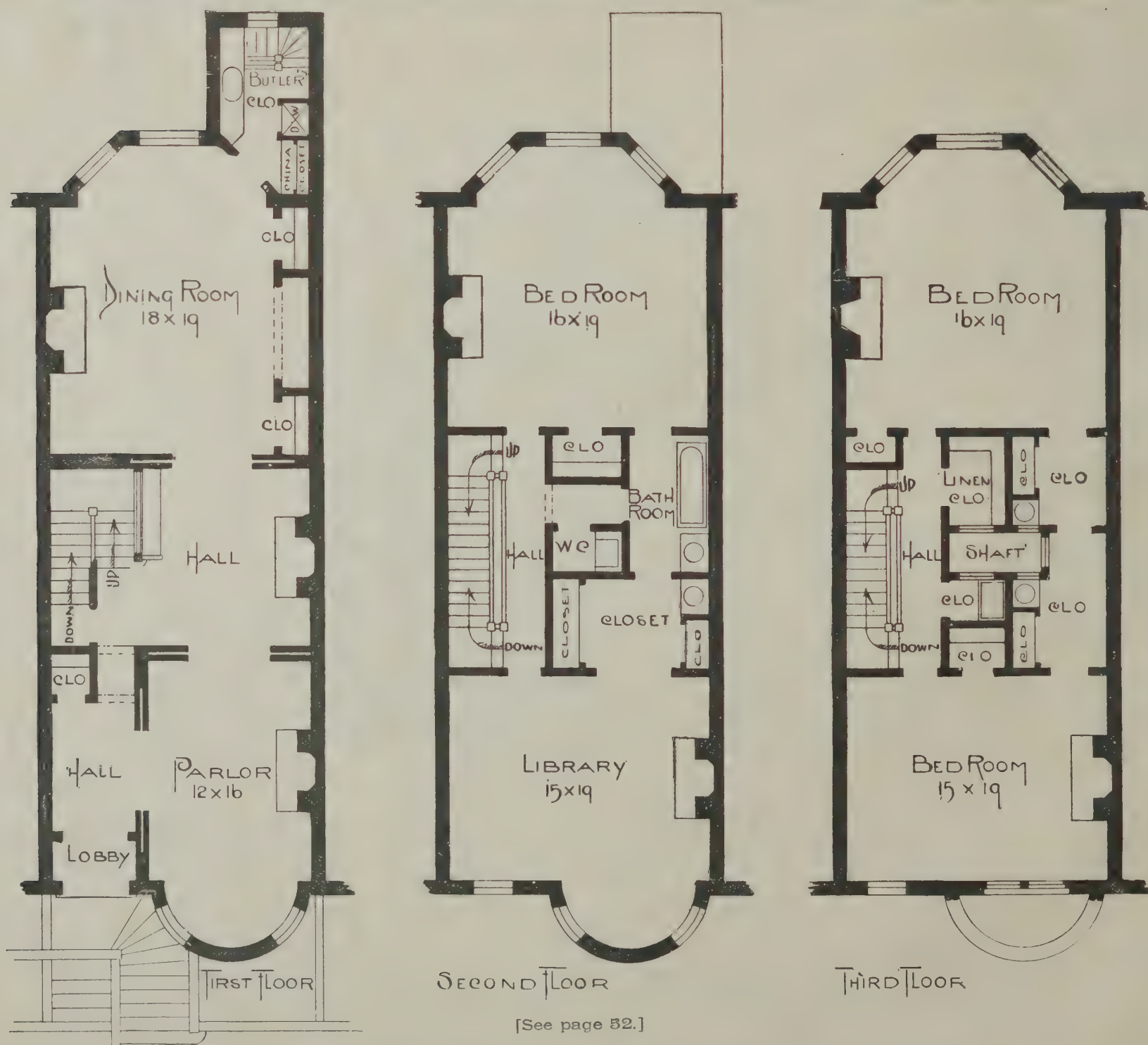
## Iron and Steel for Building Purposes.

In a paper read before the Royal Institute of British Architects, Mr. T. F. Reade gives the following points in reference to wrought iron and steel riveted girders:

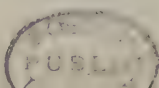
"It is of the utmost importance that all riveting should be done in the best possible manner. The 'snap,' or end of the rivet, which is hammered out while hot, should project uniformly all around the diameter of the rivet, and should be of uni-

form size. The plates or angles should have the rivet holes countersunk by the drilling machines, and show on the outside at least one-fourth inch to three-fourths inch larger in diameter than the size of the insert. It is not advisable to make the webs of steel girders as thin as the increased strength of the material would seem to render possible, except in girders of dimensions much beyond our present example. In the rivet holes in both materials it is usual in good work that all holes should be drilled, but in steel girders of any description this must be done, for the effect of punching upon the steel is to weaken the metal for a certain distance round the hole. This is remedied by punching the holes  $\frac{1}{8}$  inch less than the diameter of the rivet, and then drilling out the holes to the larger size.

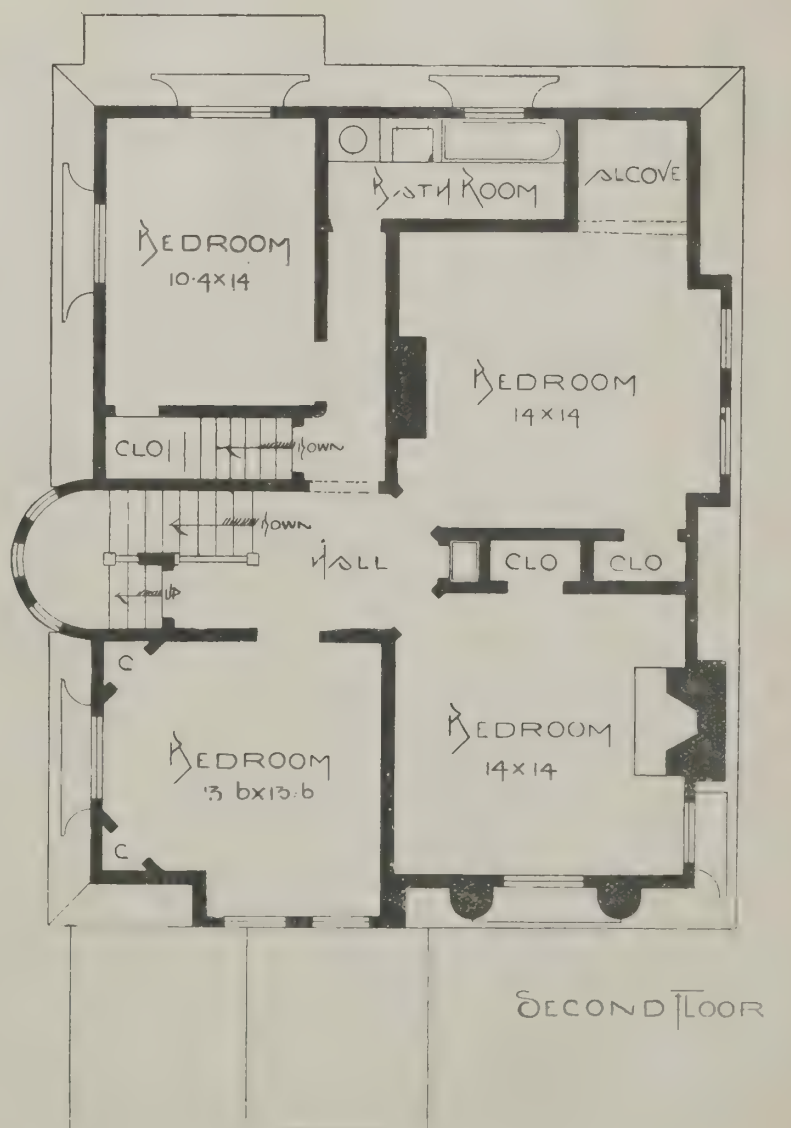
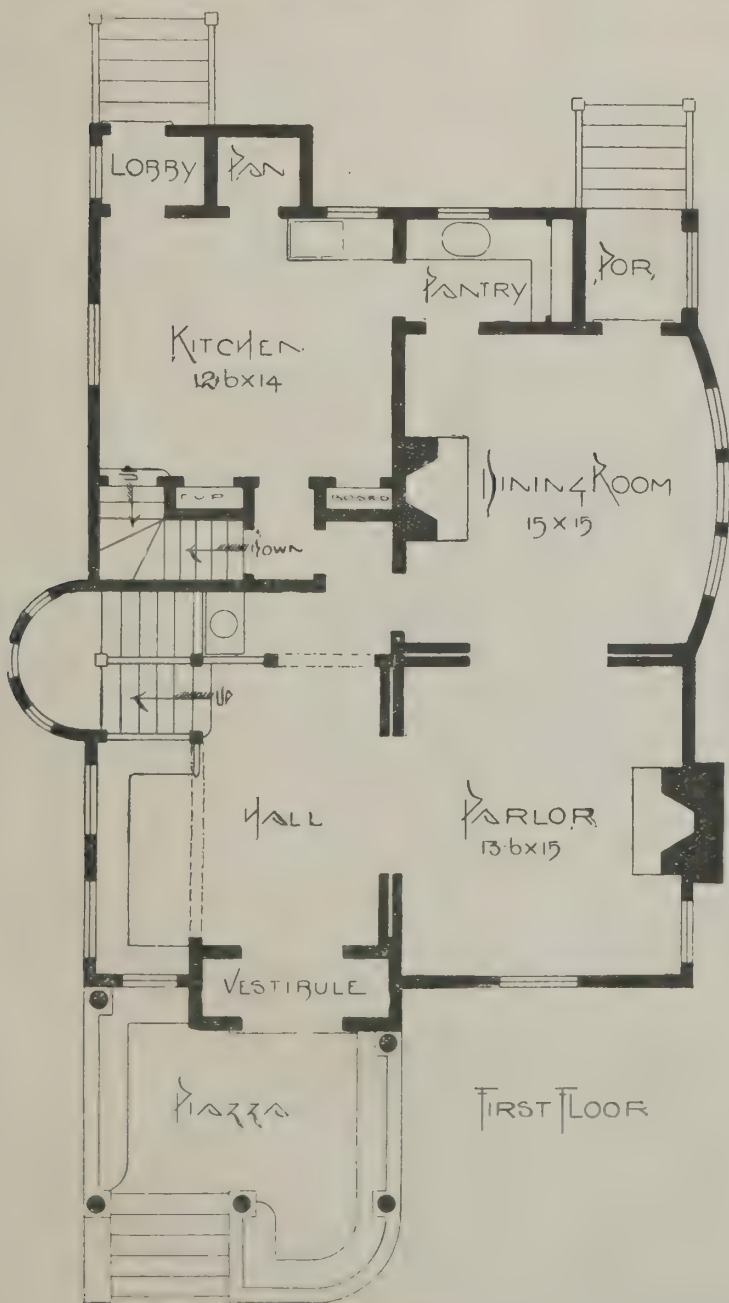




NEW DWELLINGS NEW YORK CITY.





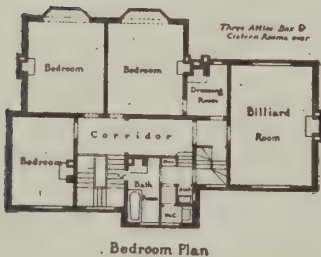
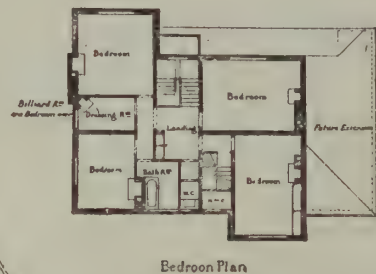
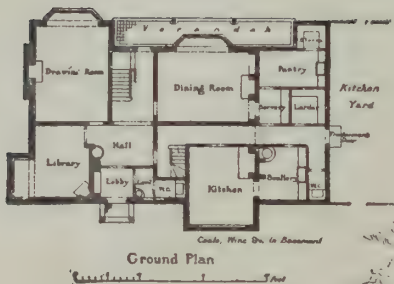
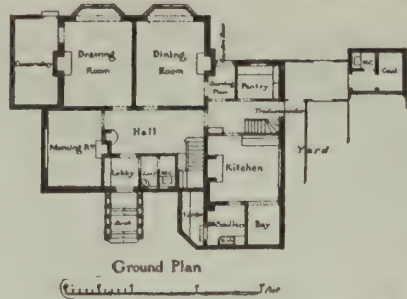


[See page 52.]

A COTTAGE AT NEW HAVEN, CONN.







DETACHED HOUSES,

RECENTLY ERECTED

Ernest Newton Architect

RECENTLY ERECTED ENGLISH COTTAGES.

RECENTLY ERECTED ENGLISH HOUSES.

By the kind permission of the author we are enabled to publish four of the best designs from "A Book of Houses," just published and dedicated by Mr. Ernest Newton to his master, R. Norman Shaw, R.A. This little folio is illustrated by plans and views printed in *fac-simile* from photographs of recently erected houses. The illustrations show both the merits and the weakness of photography. They have the advantage of showing the buildings as actually finished in every detail, but they present the houses in a very heavy and unattractive fashion, such as they would not bear in reality, for there is nothing so dead-looking in nature

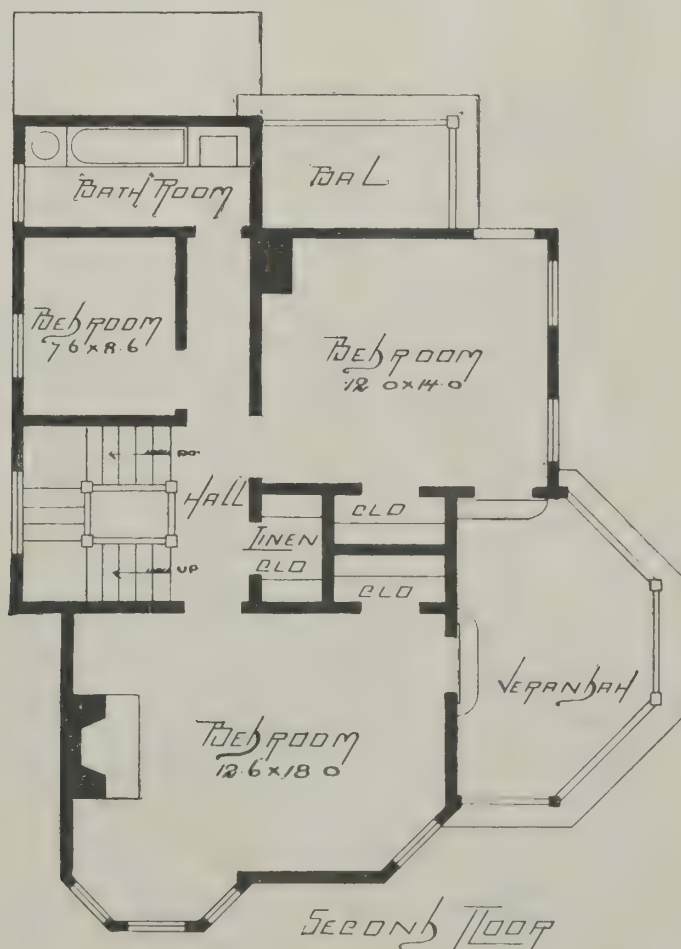
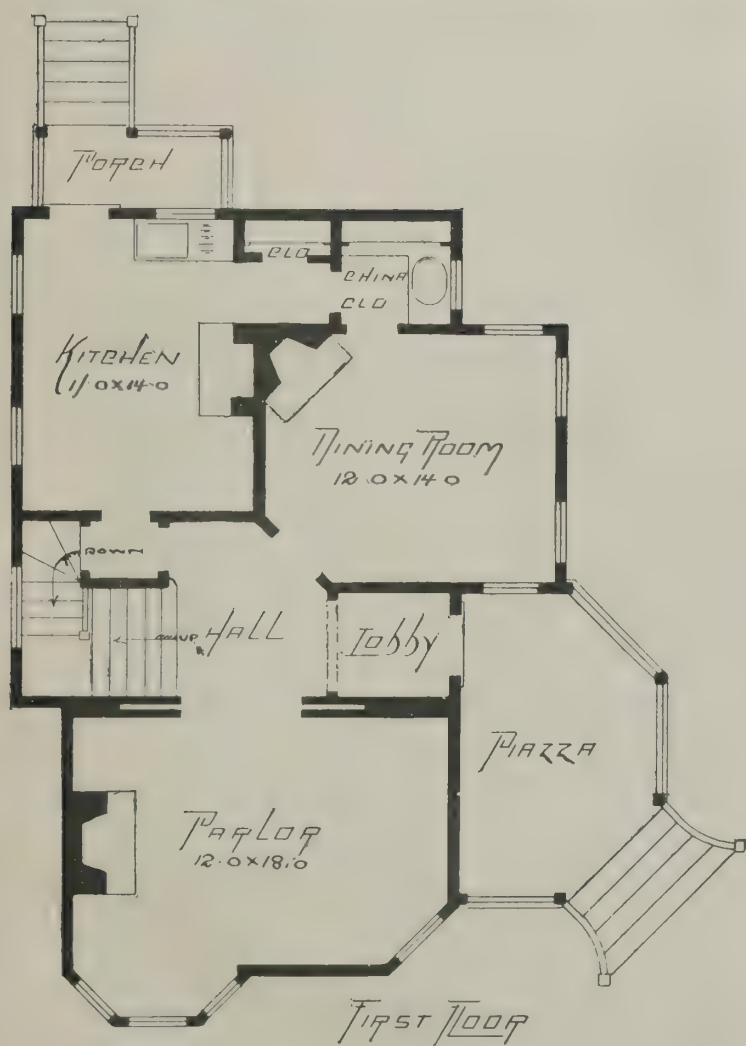
as these photographs portray. It is a very good feature of the illustrations that they show the entrance or road front and the garden front as well. Mr. Newton has done much admirable work as the architect of moderate sized houses, such as those here shown, ranging from about \$5,000 to \$10,000 in cost, and must have had a very considerable practice in that class of work. The two lower examples on our page of sketches from the book are excellently designed exteriors, such as few old examples of the style could be found to surpass. The lower plan on that sheet will also be found a very good one. The plan shown separately on our other plate has a very pleasant feature in the entrance cor-

ridor, which might be adapted in a variety of picturesque ways.—*British Architect*.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.





[See page 53.]

A DWELLING AT YONKERS.







A DWELLING ON RIVERSIDE PARK, NEW YORK CITY—REAR VIEW.

[See page 53.]



A DWELLING ON RIVERSIDE PARK, NEW YORK CITY—FRONT VIEW.

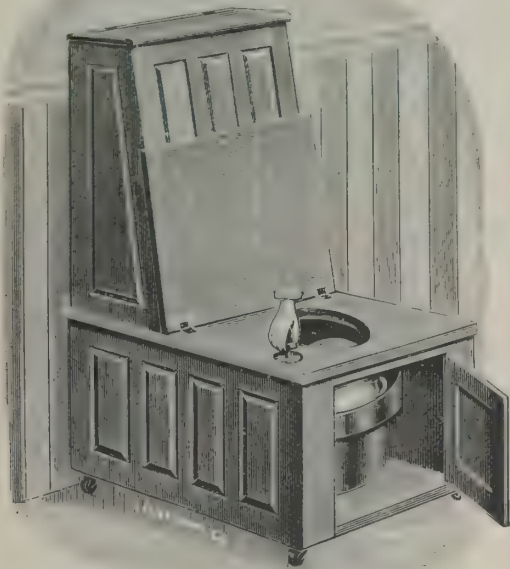
[See page 53.]





AN IMPROVED SANITARY EARTH CLOSET.

Where there are no water works or sewers, an earth closet such as is shown in the accompanying illustration is designed to serve as a convenience of the utmost importance. By its use dry earth or sifted ashes are made to absorb the offensive odors, and in a short time the resultant mass forms a rich garden soil, inoffensive to sight or smell. For its proper use three to five barrels of fine earth should be provided, in a place where it can be kept dry, and one empty barrel for changing. The case is of ash, and the receptacle, A,



LEONARD'S EARTH CLOSET COMMODE.

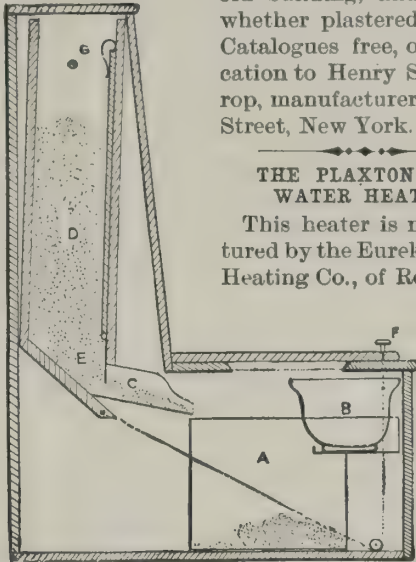
of galvanized iron, with ball and handle. The urine receptacle, B, is a common chamber vessel, and should be frequently emptied and kept clean. D is a swinging box containing the dry earth, suspended from a pivot, G, the spout, C, being held back out of the way. The flow of earth is regulated by a gate, E, and F is a bronze water closet pull attached by a rope to the swinging box, the earth being deposited on simply pulling the handle. These closets are made by the Grand Rapids Refrigerator Co., Grand Rapids, Mich.

STAMPED METAL CEILINGS.

Residence work in stamped ceilings requires the choicest designs, perfection in the seams, and a sufficient variety to meet the various sizes and purposes. The stamped ceiling invented by the manufacturer whose work is shown in the accompanying illustration meets these points, and makes a durable decoration, easily applied by decorators or carpenters.

The illustration is drawn to a scale of  $\frac{3}{16}$  inch per

foot. The parlor shows the 14 by 14 inch plates with Greek border and leaf cove, with embossed mouldings. The hall shows the 24 by 32 inch plates. The rear hall, the leaf diaper pattern, made in large sheets. The library shows panels 18 by 18 inches and 18 by 27 inches with mouldings and cove cornice. The dining room, 30 by 30 inch panels. The kitchen and pantry, a plain panel, 24 by 28 inches. The large variety of panels, borders, mouldings, etc., made by Mr. Northrop enables him to furnish ceilings suitable for all classes of buildings, and his patented method of joining the panels makes the simplest and most perfect seams. Parties writing should send a diagram of the room to be ceiled, and mention whether it is a new or an old building, and if old, whether plastered or not. Catalogues free, on application to Henry S. Northrop, manufacturer, 18 Rose Street, New York.



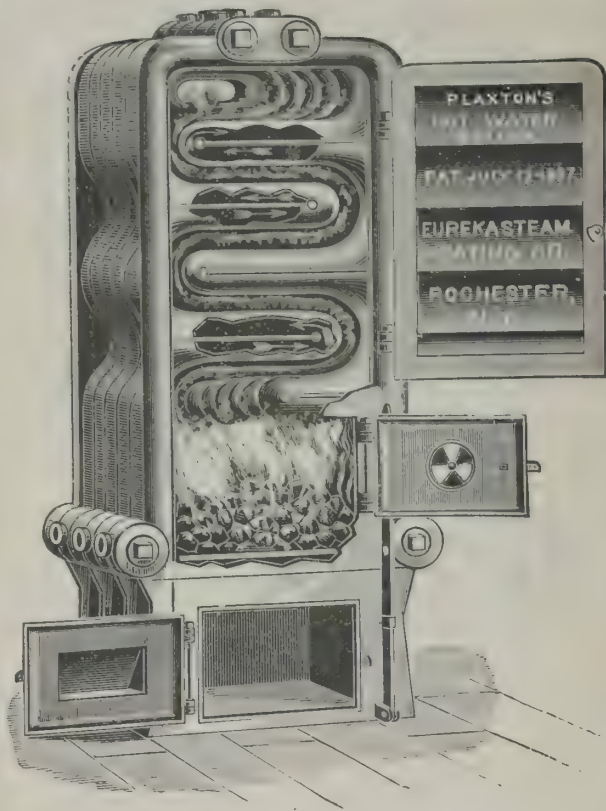
EARTH CLOSET COMMODE-SECTIONAL VIEW.

N. Y. It is a Canadian invention, which was first used in the province of Ontario, and has been put to its most thorough test in the very severe climate of Winnipeg, Manitoba, in which city it has now been in use for four years, and where more than one hundred and fifty of these heaters are in successful operation.

They are there used for heating the largest commercial buildings. For such structures, where the space to be heated is too great for the capacity of a single heater, the largest sizes are set in pairs or even in groups of three, connected by headers and so arranged that in very cold weather the group of two or three heaters, as the case may be, may be fired all at the same time, and all act together as one heater, maintaining the circulation in the whole connected system of piping. In milder weather, only one heater need be fired. The economy of this arrangement and its adaptability to changes of temperature is apparent.

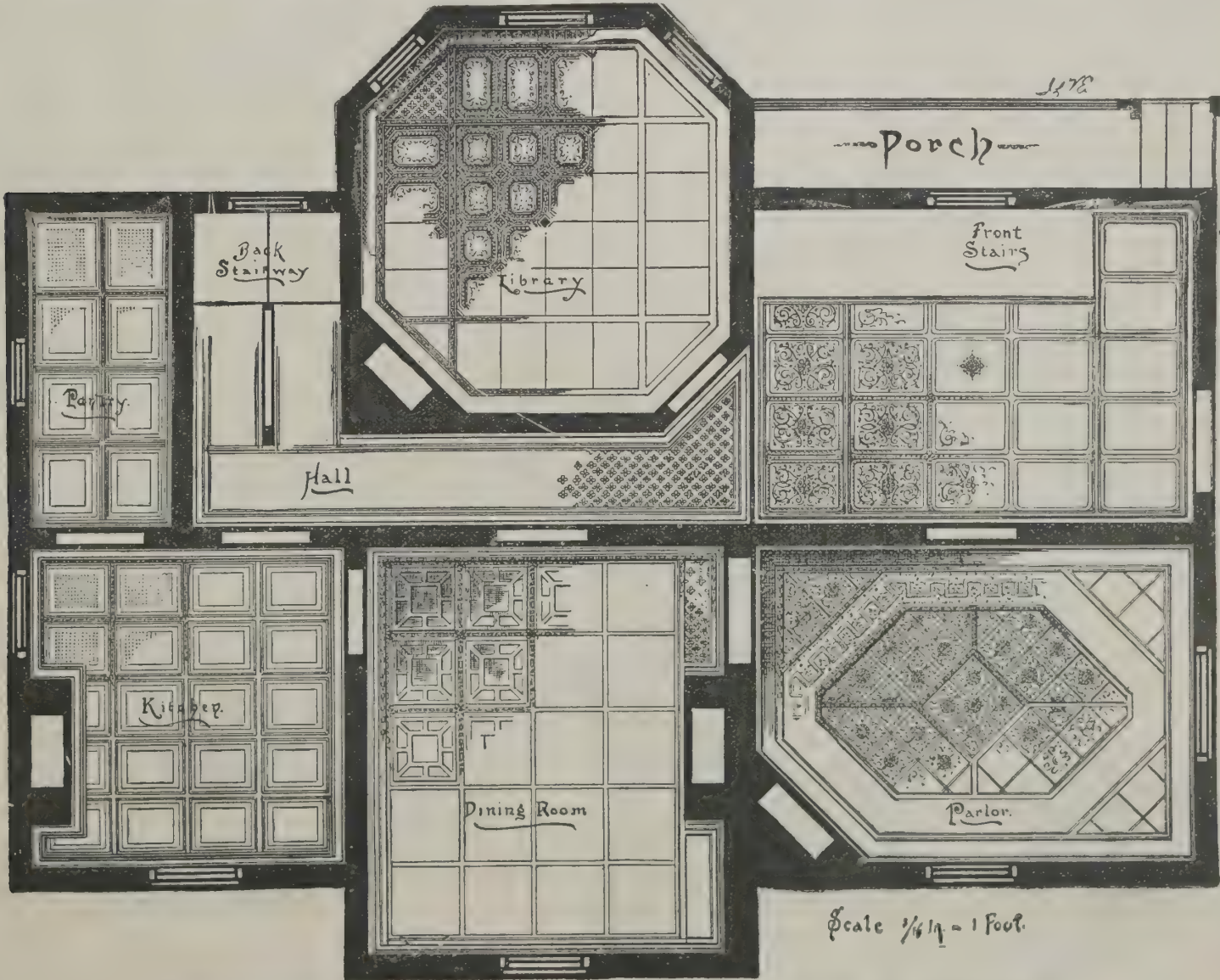
It is simple in construction and can therefore be furnished at a moderate price. There are no parts liable

to give out or get out of order. The entire back and front, except the doors, are water spaces, while the body of the heater is composed of sections made in pairs, with intercalating fingers, as plainly shown in the cut. These fingers are not simple water spaces. A diaphragm is so placed in each that the finger, except near its extremity, is divided into two parts, one above the other. This device insures a positive circulation in



THE PLAXTON HOT WATER HEATER.

the general upward direction throughout the entire length of each section and its fingers. The pairs of sections and their fingers, when set up in the assembling of the heater, stand in close apposition with each other and so form the sinuous flue which is the most striking and unique feature of the apparatus. The large cleaning door gives an open view of all these fire surfaces and renders it easy to clean the fire. The heater when set up is covered with a smooth jacket of asbestos mortar, which prevents loss of heat by radiation into the cellar. The rocking grate, with its vertical shaking handle, is convenient and labor saving. The proportion of grate surface to fire surface is properly adjusted and is constant throughout different sizes. The Eureka Steam Heating Co. will furnish all correspondents with testimonials attesting its highly successful record.

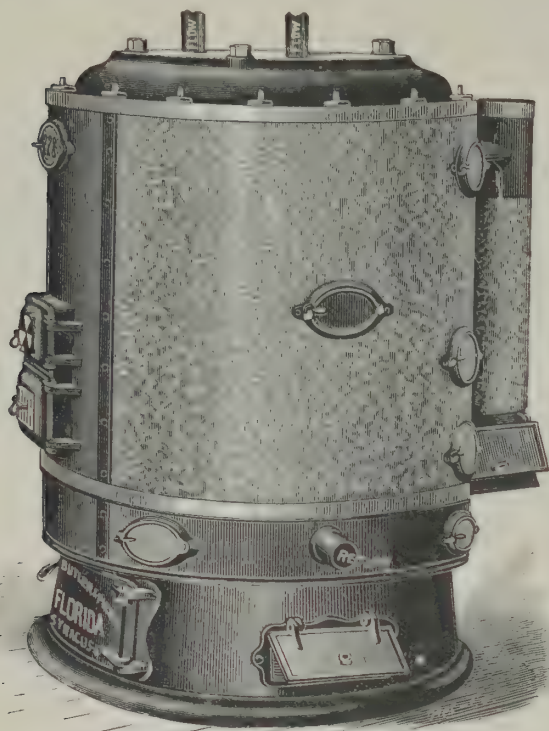


APPLICATION OF NORTHROP'S STAMPED METAL CEILINGS IN RESIDENCES.



## A HOT WATER HEATER FOR SOFT COAL.

The "Florida" Surface Burning Hot Water Heater, shown in the accompanying illustration, is specially designed for the use of soft coal, although it gives excellent results when used with any other kind



THE FLORIDA HOT WATER HEATER.

of fuel. It has all the most modern improvements and attachments, and is a heater whose parts can be thoroughly cleaned in a very short space of time, and one which the user will find handy, simple, and exceedingly easy to take care of. The principle



CORRUGATED WATER SECTION.

of the circulation in this heater is correct, the flow of the water being easy and rapid. The waterways are large, and the sections are so completely and effectively enveloped in the products of combustion that the water, before reaching the flow pipes, gets the full benefit of the fire. An examination of the section here shown quickly convinces one that the surfaces of this heater

must be most powerful and effective, and that the best results can be obtained from such a construction.

The manufacturers have altogether sixty-seven sizes of heaters, those for steam carrying as high as forty-two hundred square feet of radiation. For hot water, seventy-three hundred feet. Their double heaters and heavy duty heaters have largely been adopted by the trade throughout the country. They are made as a substitute for the wrought iron tubular boilers. They take up but a small amount of space in a cellar, can be taken into any building without special provision being made, and can be set up ready for piping in a short time. They have heavy galvanized iron jackets lined with asbestos.

The Pierce, Butler & Pierce Manufacturing Co., of Syracuse, N. Y., the makers of these heaters, have offices at New York and Chicago, and will be glad to aid their customers in drawing up specifications or plans for heating apparatus.

## AN IMPROVED WOODWORKING MACHINE.

The machine shown in the accompanying illustration planes twenty-five inches wide and six inches thick, and matches twelve and a half inches. It has two feeds, thirty-five and sixty lineal feet per minute, and weighs about 3,000 pounds. The machine has been designed and perfected to meet the demands of woodworkers for a medium and combined machine, at a moderate cost, one embracing the most valuable features of the highest priced machines, while being strongly built and easy of adjustment. The bed is cast in one piece, and fitted into the frame between long, heavy guides with gibs and adjusting screws, so that wear may be easily taken up and the bed will always fit perfectly. The entire bed, with matcher beads, is raised and lowered by a large hand wheel, an indicator showing the exact thickness the machine is set to plane. Full information relative to this machine will be furnished by the manufacturers, the Indiana Machine Works, Fort Wayne, Ind.

## AN IMPROVED CASING FOR STEAM PIPES.

The Wyckoff patent steam pipe casing shown in the accompanying illustrations is made of double thicknesses of eight thoroughly seasoned one inch white pine staves to each section. The staves of the inner course are jointed together and wound with galvanized steel wire, then wrapped with two thicknesses of heavy corrugated paper, after which another casing of staves is put on the outside and wound with galvanized steel wire. The outer casing is then coated with asphaltum. Fig. 1 represents a section of such casing complete, there being two staves removed from the casing, as shown in Fig. 2, to disclose the lining between the inner and outer courses. Fig. 4 shows the manner of casing tees and elbows. To cut the casing lengthwise, where this is necessary in putting it around pipes in position, the asphalt coating is first removed, when the binding wires are cut by a file or otherwise, and their ends fastened down by a common blind staple. This allows the outside casing to be laid open, as shown in Fig. 3, a similar process being followed in opening the inner casing. Different sections of this casing are conveniently joined by cutting off, at the ends, a small portion of the inner and outer casings, whereby a lap joint is readily formed, and in calculating the sizes of casing required, proper allowance should be made for the pipe couplings.

It is said that in comparative tests of this casing with

one made of solid wood, both round and square, in the same line of pipe, the sectional casing has proved greatly superior. The solid wood casing rapidly became checked, and so heated throughout as to cause material loss of heat, while the sectional casing, owing to the interposed non-conducting layers, remained perfectly cool on the outside.

The manufacturers of this steam pipe casing have also had great success, during several years past, in the manufacture of plain square water and tan liquor pipe, of wood. This pipe is made in lengths of six to eight feet each, connected by a water and air tight socket

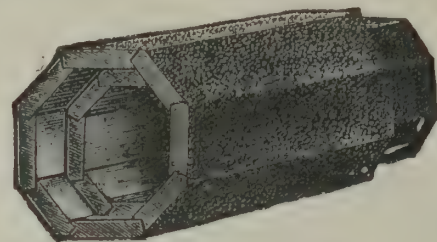


Fig. 1.

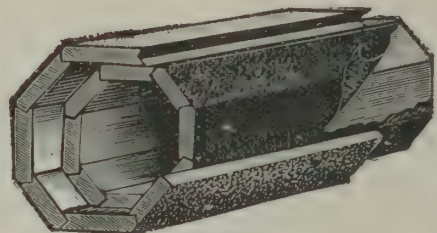


Fig. 2.

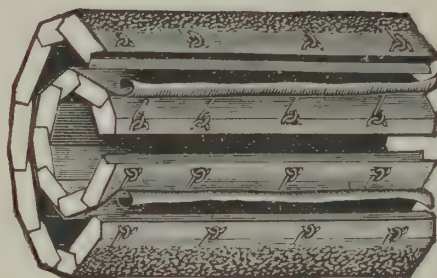


Fig. 3.

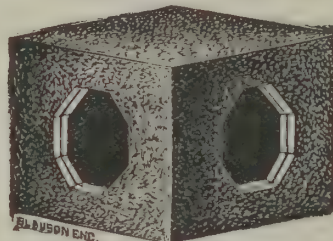


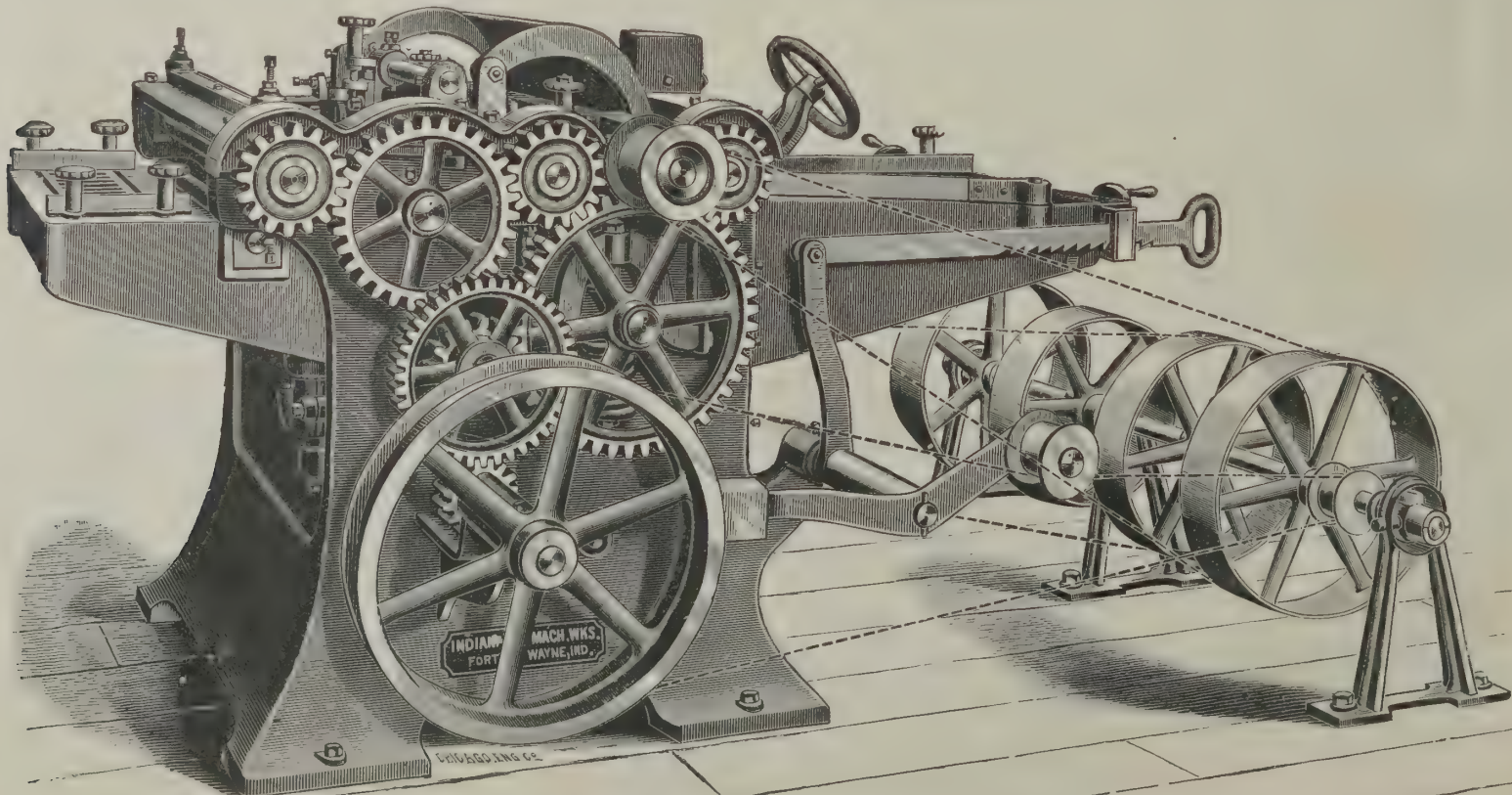
Fig. 4.

THE WYCKOFF STEAM PIPE CASING.

joint, and easily put together by a common laborer, forming a very cheap conductor. They also make a round and coated wood pipe, and one strengthened with spirally wound hoop iron.

These different varieties of pipe and pipe casing are made by Messrs. A. Wyckoff & Son, Elmira, N. Y.

TO TAR IRON PIPES.—Coat the outside with coal tar, and build a light fire of shavings in the inside. This makes the coating solid. Too much heat melts the tar, so that it runs off the pipe.



THE No. 1 CLIPPER PLANER, MATCHER, AND MOULDER OF THE INDIANA MACHINE WORKS.



# SCIENTIFIC AMERICAN

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AND BUILDERS

EDITION.

Vol. XL. Subscription, \$2.50 a Year.

NEW YORK, MAY, 1891.

Single Copies, 25 Cents. No. 5.



DESIGN FOR A STAIRCASE.

[See page 66.]



# Scientific American.

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O. D. MUNN.

A. E. BEACH.

NEW YORK, MAY, 1891.

THE

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ARCHITECTS AND BUILDERS EDITION.

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All who contemplate building or improving homes, or erecting structures of any kind, have before them in this work an almost *endless series of the latest and best examples* from which to make selections, thus saving time and money.

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**Bound Volumes.**—Two volumes are published annually. Volumes 1 to 10, which include all the numbers of this work from commencement to close of 1890, may now be obtained at this office or from Booksellers and Newsdealers. Price, bound in paper, \$2 00 per volume. These volumes contain all the colored plates, sheets of details, specifications, and all the other interesting matter pertaining to the work. They are of great permanent value. Forwarded to any address.

MUNN & CO., Publishers,  
361 BROADWAY, NEW YORK.

We can supply at moderate cost the full plans, specifications, details, bills of materials, etc., ready for the builder, for any of the structures illustrated in this publication. We are assisted by a staff of able and experienced architects.

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## DESIGN FOR A STAIRCASE.

We are indebted to Mr. P. W. Merrill, architect and builder, Pueblo, Col., for the design for a staircase of which we give a plate on page 65. Our engraving is from a photograph of the staircase as completed in Mr. Merrill's residence. It is pleasing and novel in appearance. At the foot of the stairs there is a fine stained glass window, which fills the stairway with colored light.

## A RESIDENCE AT RUTHERFORD, NEW JERSEY.

One of our colored plates, and other views, page 69, illustrates a residence erected for Henry Iverson, Esq., at Rutherford, New Jersey, and from plans prepared by Mr. W. H. Miller, of Ithaca, N. Y. The building as now completed is one of the most picturesque and best appointed country houses in the vicinity of New York. The aim of the architect has been to avoid unnecessary ornamentation and to show an appropriate and quiet style of architecture. The exterior walls throughout are built of Belleville stone, laid up at random, with door and window trimmings of similar stone. Mansard roof, covered with red English tiling, finished with cresting and finials. Main hall and staircase are of special interest. It is in English style, and finished in quartered oak. The ceiling is of oak, heavily beamed and ribbed, forming deep panels, from the centers of which are suspended numerous wrought iron lamps of antique design. The broad staircase with magnificently carved newels, the antique mantel and paneled divan, are the principal features of hall. Both upper and lower halls have paneled wainscoting. The floors throughout are of oak, highly polished. Drawing room is trimmed with black walnut stenciled in gold, and is furnished with fireplaces faced with Italian marble. The mantels are elegantly carved, and have beveled plate mirrors running to ceilings. Library is finished in black walnut. Book cases, lounge and seats are built in. Fireplace has tiled hearth, facings of Mexican onyx, and mantel of walnut. Music room is located over the porte-cochere, and is reached by the staircase. It is treated with ivory white and gold in a delicate manner, and is furnished with rare bits of carving, a grand fireplace, spindle transoms and stained glass windows, the latter shedding a soft and pleasant light over this apartment, hall and staircase. Dining room is finished in quartered oak, and is a mixture of Gothic and Renaissance styles. It is wainscoted four feet high, and the ceiling is ribbed with oak. Buffet, china closets, beaded windows and seats, carry out the antique effect so successfully sought. Kitchen, servants' dining room and other apartments are replete in all their appointments. Second floor is trimmed with hardwood, some of the rooms being finished in ivory white, bronze, gilt, and natural. Bath rooms are wainscoted with white English tiling, and are fitted up in the best possible manner. Third floor contains four bed rooms and billiard room, besides two servants' rooms and bath. Cellar is complete in all its various apartments.

Our plate was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

## A RESIDENCE AT BRIDGEPORT, CONN.

One of our plates in colors this month shows the residence of Mr. George Comstock, Bridgeport, Conn. It is located on Park Avenue, corner of Park Place, beautifully situated on high ground, overlooking the park and Long Island Sound. It is a frame house constructed in most thorough manner, and of best materials throughout. The lower part is clapboarded, the upper covered with cut shingles, the gables being paneled. The roof is of black slate, the windows are glazed with plate glass, with bent glass in windows of round tower.

This house is generally conceded to be one of the handsomest in Bridgeport.

The plan is roomy and conveniently arranged. Entrance is had through the tiled vestibule into the large and fine reception hall, which is finished in quartered oak, and has a handsome paneled and carved staircase winding up on one side, finely lighted by large stained glass windows. In the front part of the hall is a screened alcove, with very wide window and stained glass transoms over. The hall is also entered on the side back of staircase, from the side entrance and porte cochere.

The hall connects with parlor, library, and dining room through wide sliding doors. The parlor has round corner bay window in tower, and the ends of library and dining room also finish in octagonal bay windows. These rooms are all handsomely finished in natural woods, and have fine carved mantels. The hall and dining room are in quartered oak, parlor in mahogany, library in cherry.

The rear part of house is entered from dining room through butler's pantry, and from sitting room through lobby containing rear stairs. Ample kitchen and pantry accommodations are contained in the rear part. The second story contains large square hall and passage to rear; four large chambers, three with bay windows; large dressing room, bath room, and closets.

In the third story are finished two chambers and stair hall.

The cost of this house, as built, is about \$10,000. Architect, Joseph W. Northrop, of Bridgeport, Conn. Our plate was prepared from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

## A RESIDENCE ON POWELTON AVENUE, PHILADELPHIA, PA.

We present, on page 68, engravings showing a perspective and floor plans of a residence erected for Geo. Burnham, Esq., at Powelton Ave., Philadelphia, Pa., and from plans prepared by Mr. T. P. Chandler, same place. Dimensions: Front, 65'; side, 78', not including rear porch. Height of ceilings: Cellar, 8'; first story, 11'; second, 10'; third, 9'. The exterior walls throughout are built of Leiper stone, laid "rock-faced" ashlar. Roof is covered with octagonal cut slates. This design comprises both elegance and convenience, the plans showing large connecting rooms all fitted up in the most elaborate manner. Vestibule has a mosaic tiled floor. Hall and staircase hall are trimmed with quartered oak. The ceilings are of oak, heavily beamed and ribbed, forming deep panels. Halls have paneled wainscoting. Staircase of oak, with carved newels. Reception room and parlor are trimmed with mahogany, the latter having a paneled ceiling, with a heavy mahogany cornice. Den, or library, is trimmed with butternut, and furnished with bookcases, ceiling beams, etc. Dining room is finished in the old colonial style, and is trimmed with quartered white oak; it is wainscoted in panels five feet high, and the ceilings are ribbed with oak. The principal fireplaces have tiled hearths, Mexican onyx facings, and elegant carved mantels, with mirrors, etc.; other fireplaces have tiled hearths and facings and hardwood mantels. Floors are of oak. Kitchen, servants' hall, dining room, and other apartments are trimmed and wainscoted with ash and fitted up replete. Second floor is trimmed with cherry, and contains seven bedrooms, all provided with ample closet room, and two bathrooms. Bathrooms are wainscoted with white English tiling, and each one furnished with tub, bowl and closet, in the best possible manner. There are five bedrooms, bath-room and billiard room on third floor. Cemented cellar contains laundry, furnace and other apartments. Heated by steam.

Our engraving was made direct from photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## A DWELLING AT NEW HAVEN, CONN.

We present on page 71 an engraving showing a dwelling erected for Mr. John French, at New Haven, Conn. Dimensions: Front, 40 ft. 6 in.; side, 51 ft. 6 in., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 10 ft.; second, 9 ft.; third, 8 ft. Underpinning built of brick; exterior throughout is sheathed, papered and then covered with shingles, stained sienna, with trimmings painted white. Roof shingled, painted red. Vestibule has a tiled floor. Hall is provided with a unique staircase of ash, with two landings and a wide open well hole. This staircase is lighted by a stained glass window. Parlor, library and den are trimmed with cherry, dining room with ash, and kitchen and its apartments with yellow pine; the latter being wainscoted and fitted up replete in the best possible manner. Fireplaces have tiled hearths and hard wood mantels. Floors throughout are laid with quartered oak in geometrical designs and highly polished. The windows of the principal rooms are glazed with polished French plate, and are also provided with inside blinds. Second floor contains six bedrooms and bathroom, all trimmed with whitewood, finished natural. Third floor (attic) contains four bedrooms and storage. Cemented cellar is provided with furnace and other apartments. Cost complete, \$6,345. Contracts as follows: Masons' work, \$1,545; joiners' work, \$4,200; plumbers' work, \$375; painters' work, \$225. Mr. C. H. Stilson, architect, same place.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

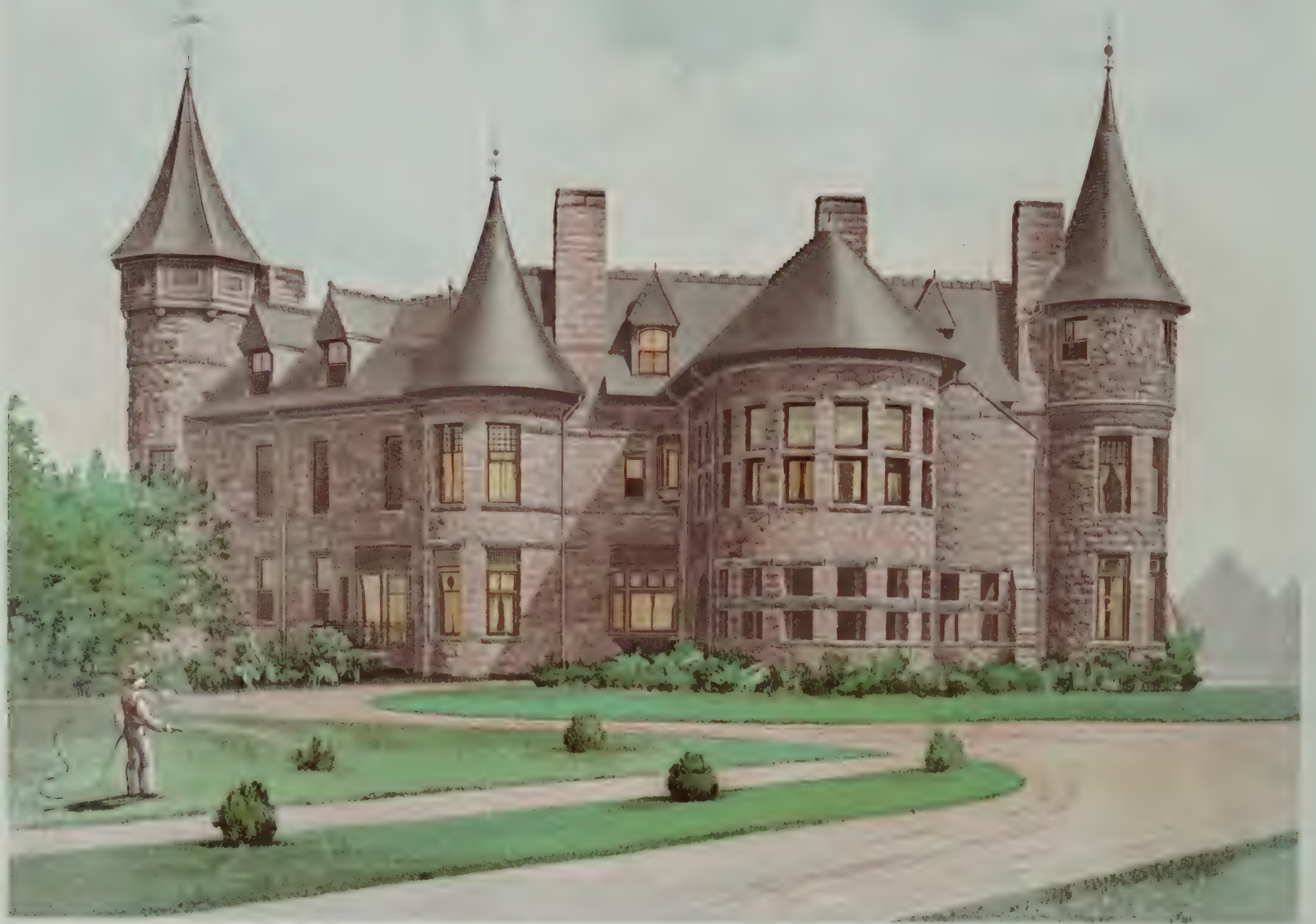
## A SUBURBAN CHURCH.

The illustrations on page 73 show perspectives and ground plan of the First Presbyterian church, recently erected at Rutherford, New Jersey. The design is treated in the rural English Gothic style, with low side walls and gables. All the floors are of one level, the class and Sunday school rooms being thrown out at right angles with the main edifice, and other projections, with deep transepts, make the ground plan quite broken and irregular. The grouped parts are relieved from a too depressed appearance by a heavy tower, at the intersection of nave and transepts, with battlements and gargoyles, and a spire surmounting it. The walls are built of gray Belleville stone, laid rock-faced ashlar. The extreme length, including porte cochere, is 189 ft., and the width is 131 ft. The main auditorium is cruciform, with a seating capacity of 600. The









A RESIDENCE AT RUTHERFORD PARK, N.J.

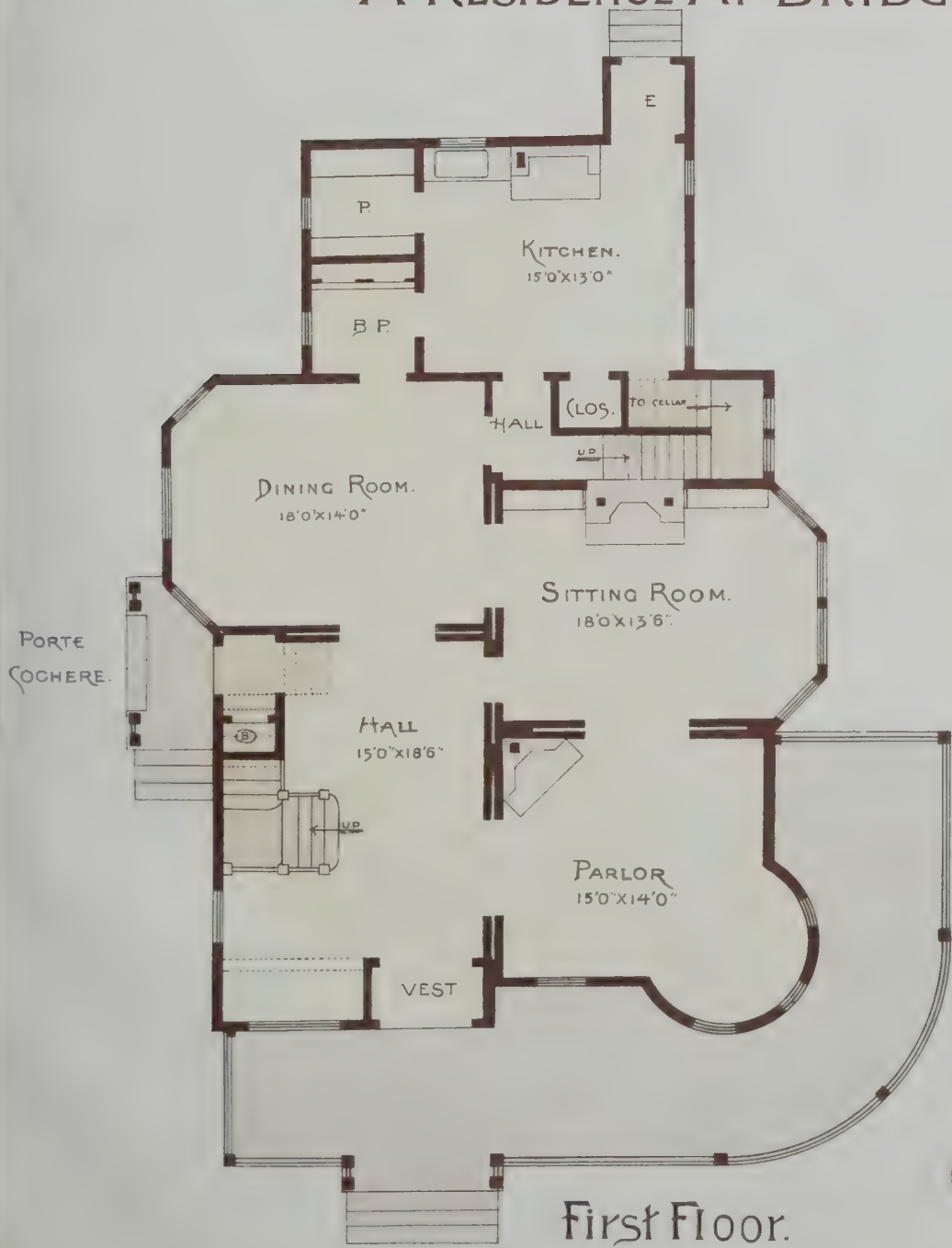


First Floor Plan.

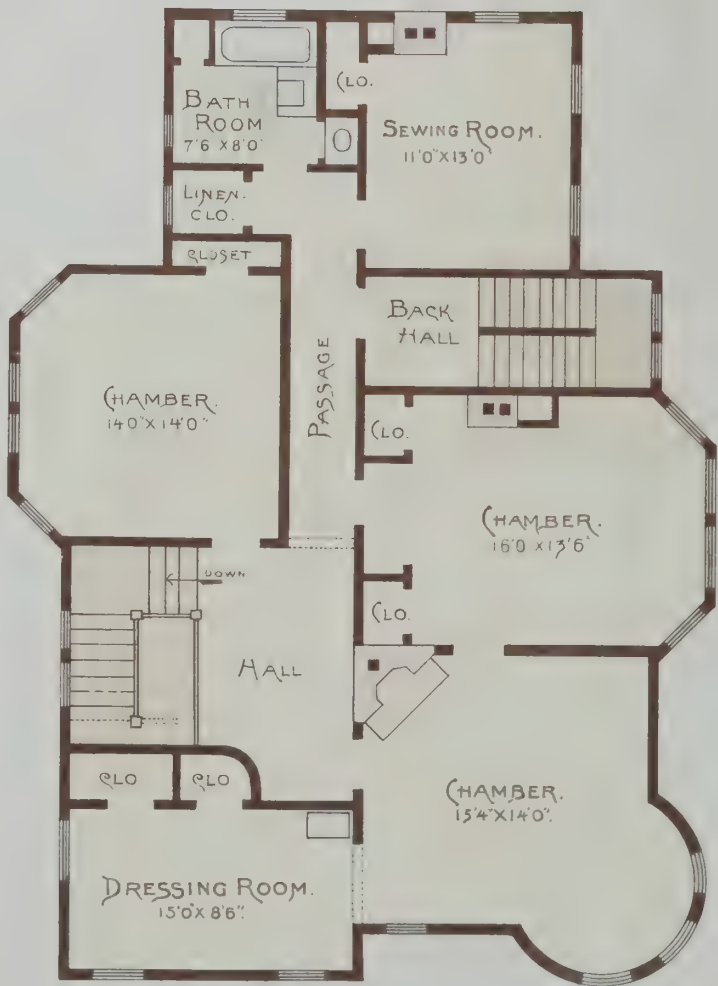




A RESIDENCE AT BRIDGEPORT, CONN.



First Floor.



Second floor.







length through the nave to back of chancel or apse is 98 ft., and its breadth across transepts is 78 feet. The nave is 44 ft. wide and the transepts 26 ft. Two of the massive supporting columns of the tower appear at the intersection of nave and transepts, and from these spring a series of arches, above which the base of the tower is pierced on three sides with lantern lights. The roofs are upheld by heavy trusses, and the ceilings are paneled in wood. The interior throughout is trimmed with Southern pine and Michigan brown ash. Sunday school room (44×60) and class room (20×30) will accommodate 500, and are finished similar. Four tiled vestibules give convenient access from all points. There are also toilet rooms, library, refectory, study and parlor (20×24), the two latter furnished with open fireplaces and antique oak mantels. Gas fixtures are of wrought iron. Harmonious shades of brown and amber are predominant throughout the interior. The windows of the main building are of a memorial character, and are made from special designs. The children's window in the apsidal end of the Sunday school room shows winged cherub heads on a background of clouds, and on either side an appropriate text, framed in glass jewels. The kitchen and its various apartments are conveniently located in cellar, with dumb waiter connection to pantry on ground floor. All parts of the edifice are warmed by steam, and provided with water and gas. The total cost, including furnishing and everything complete, was \$70,000. Messrs. Fowler & Hough, New York, architects.

Our engravings are made direct from photographs of the building specially taken for the SCIENTIFIC AMERICAN.

#### A GABLED COTTAGE.

On page 73 we present a very attractive and picturesque cottage erected for Messrs. Wendell & Smith, at Wayne, Pa. Dimensions: Front, 43 ft.; side, 49 ft. 6 in. Height of first story, 9 ft.; second, 8 ft. 6 in. Underpinning and entrance way to porch are built of Chestnut Hill granite, "rock-faced" and laid at random. The superstructure above is of wood covered with clapboarding, and painted light olive green, with bottle green trimmings. Roof shingled and painted red. The plan is unique. It contains spacious rooms, conveniently located and fitted up in a first class manner. The large square hall is trimmed with oak, and contains an ornamental staircase of similar wood. The front door and window at side are glazed with stained glass. Reception room and parlor are trimmed with cherry and dining room with oak. The floors are of yellow pine. Fireplaces have tiled hearths and hardwood mantels. Kitchen, laundry, and pantries are trimmed and wainscoted with North Carolina pine, finished with hard oil. Second floor contains five bed rooms and bath room, the former trimmed with white wood, finished natural, and provided with large closets. Bath room is wainscoted and finished complete, the plumbing being of the best description. There is ample storage room in attic. Cemented cellar under whole of building, contains furnace, etc. Cost \$3,800 complete. Mr. F. C. Worthington, architect, Philadelphia. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

#### A COTTAGE AT FANWOOD, NEW JERSEY.

We illustrate on page 74 a cottage erected for Mr. H. Robinson, at Fanwood, New Jersey, from plans prepared by Mr. Augustus Frenz, same place. Dimensions: Front, 34 ft.; side, 36 ft. 6 in., exclusive of rear porch. Height of ceilings: Cellar, 7 ft.; first story, 8 ft. 6 in.; second, 8 ft. Underpinning built of rock-faced stone. First story clapboarded and painted light olive green, with bottle green trimmings; second story shingled and painted colonial yellow. Roof shingled, painted red. In the arrangement of rooms all the space is utilized to the best advantage. Large sliding doors connect the principal rooms on first floor. Trim throughout is of whitewood. Hall spacious, contains an ornamental staircase turned out of ash, and a fireplace built of buff brick, and provided with an oak mantel. Parlor finished in cherry. The fireplace has a tiled hearth and hard wood mantel. Dining room is finished in ancient oak. The rest of the woodwork is finished natural. Kitchen and pantries are wainscoted, and fitted up replete. Second floor contains four bed rooms and bath; the latter wainscoted and fitted up with tub, bowl and closet complete. Attic contains one bed room and ample storage room. Cemented

cellar, contains furnace. Cost, \$4,200 complete. Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

#### A COLONIAL COTTAGE.

Below and on page 76 we illustrate a cottage, colonial in treatment, erected for Mr. James L. Stewart, in Armour Villa Park, Bronxville, N. Y. The design has a very picturesque and comfortable appearance, while the interior is equally attractive with its various apartments, conveniently located and furnished with the improvements. Dimensions: Front, 27 ft. 6 in.; side, 43 ft. 6 in., not including porches. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in. Foundation of stone. The exterior is clapboarded and painted bottle green, with trimmings of a darker shade. Roof shingled. The interior throughout is trimmed with yellow pine, finished natural with hard oil. Staircase is of yellow pine. Parlor is provided with an open fireplace, built of brick, with a tiled hearth and a hard wood mantel. Kitchen and its apartments are wainscoted with narrow beaded stuff, and fitted complete. Second floor contains four bed rooms, large closets and bath room. Bath room is wainscoted and provided with tub,



A COLONIAL COTTAGE.

bowl and closet. Attic contains one bed room and ample storage. The walls are brown coated and finished in tints. Cemented cellar under whole of house. Heated by a furnace. Cost, \$2,800. Mr. W. W. Kent, architect, New York.

Our engraving was made direct from photographs of the building especially taken for the SCIENTIFIC AMERICAN.

#### John W. Root.

The sudden and mournful death of Mr. John Well-born Root, architect, of Chicago, has cast universal sorrow over the profession of architecture throughout the country. His quick powers of perception in association interests and on the floor in conventions, his correct analysis of questions under debate, and his ready solution of what has often seemed to be an entangled controversy, have proved his great ability and superior judgment, and the appreciation of his worth has been evidenced by his elevation to offices of trust and honor. In the Western Association of Architects he was elected in the second year of its organization to the office of secretary, and later to the president's chair. In the union of this association with that of the American Institute of Architects he was chosen secretary of the newly consolidated society, and was but recently re-elected to the same office for the current year. He was often placed at the head of committees

upon important work, and he has at all times proved himself invaluable to the interests he espoused. He was always prominent in social intercourse and in hospitality on the occasions of architectural conventions, and to members of the profession who have met him at such times he has left a stronger and more pleasant personal remembrance than almost any other among those who but occasionally come together, while others who had the pleasure of his confidence and near personal acquaintance were most strongly and deeply attached to him. His rare gifts of mind, his ready wit and genial disposition created for him upon every side hosts of friends.

Mr. Root was of Southern birth, and died in the prime of manhood and at the height of his fame. His birthplace was Atlanta, Georgia, and he was born in the year 1851, his father being Col. Sidney S. Root, a wealthy planter. He attended school in England and college in New York, and after graduating from the latter entered the offices of Renwick & Sands, and later that of John B. Snook. He afterward went to Chicago, and was employed in the office of Mr. P. H. Wight. In 1873 he entered into partnership with Mr. D. H. Burnham, and it is hardly necessary to detail by name the architectural triumphs of the firm of Burnham & Root. Every architect in the country knows of them.—N. W. Architect.

#### Statuary Marble.

Statuary white marble, when faultless in color and texture, is worth from \$15 to \$20 per cubic foot. For statuary purposes it must be like the finest loaf sugar, must not scale or split in any direction, or have any "way of the grain." It must work evenly in all directions and be without veins or clouds, and free from any such impurities as mica or tale, which latter spoil some of our American marbles.

Comparatively few localities are known where good, faultless, white statuary marble occurs. Hence the quarries used by the ancients have a world-wide reputation. The white statuary marbles of the Greeks, the Pentelic and Parian, came from Mount Pentelicus, in Attica, and from the Isle of Paros, in the Mediterranean. The Parian was the most esteemed, and Phidias, Scarpa, and Praxiteles carved their masterpieces out of it. Pentelic marble is fine-grained, translucent, and waxy. The Parian is more granular, like fine loaf sugar. At first the Greeks had a monopoly in their Parian marble, till the Romans discovered large deposits of even better marble at Carrara, on the Gulf of Spezia, in Italy. The Carrara marble is coarser grained than the Parian, but pure in color and compact enough to receive a high polish.

In the United States statuary white marble has as yet been quarried only at West Rutland, Vt. Here a layer, three to four feet thick, of pure white, is interstratified with forty feet of clouded marble. It is as perfect in color as Italian, but by some it is said to be less strong and durable, though the opposite is affirmed by others. White marble of fine quality occurs also at Brandon, Vt., but in layers too

thin to allow of large blocks. The finest deposit of statuary marble known in the Eastern States is at Pittsford, Vt., in a bed twenty feet thick, equal to the finest Carrara, according to Professor Newberry.—Denver News.

## PATENTS.

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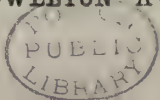
FIRST FLOOR PLAN



SECOND FLOOR PLAN

[See page 66.]

A RESIDENCE ON POWELTON AVE., PHILADELPHIA, PA.







[See page 66.]

A RESIDENCE AT RUTHERFORD, N. J.





## A DRAWING ROOM.

We give from the *British Architect* a sketch from the small drawing room in the residence of R. Norman Shaw, R.A. It is full of pleasing suggestions, which will be appreciated by all lovers of tasteful and modest decoration.

## Ornament in Architecture.

Ornament is extremely useful in conferring on buildings a degree of elegance and richness which, without it, it would be difficult to obtain; and it also may be made to convey an impression of wealth and magnificence which, in its absence, could only be attained by increased dimensions or massiveness, which would be as expensive, and, in some instances at least, less effective. Ornament is also extremely useful in altering the apparent proportion of buildings. Thus, by the employment of strongly marked horizontal lines, a building which is too tall may be reduced to proportion; one that is too low made to look nearly as high again by employing only vertical features. Buildings that from the inherent necessities of their construction look weak may be made to appear of any desired degree of strength, and sparkling gayety of effect be given to those that otherwise would be too massive and heavy. Internally, the architect very often cannot control the dimensions of his apartments, but by a judicious application of ornament he may always make low rooms look higher, narrow rooms broader, and reduce long rooms to a better proportion. More than even this, ornament enables an architect to give to every part of his design exactly that degree of prominence and dignity, and that class of expression, which suits its position or purposes. These are all legitimate uses for the employment of ornament, and when used for these purposes it is never offensive. It always becomes so when it is employed to conceal either use or construction, or to make a building try and look like what it is not or cannot be. The above, from the *Architect*, appears to be somewhat contradictory.

## Steam Pipe Required for Heating.

The question often arises, How much pipe is required to heat a building of a certain cubic capacity? Of course, this varies with the temperature of the steam used, the degree of heat required to be kept up, the frequency with which the doors are opened, the temperature of the outside air, the intensity of the wind, the area of window surface, etc. There are no two places in which the conditions are exactly alike, and it would be hard to lay down an absolute rule for any fixed set of conditions. But there are some good data which will do to start from, and a writer in the *Mechanical News* calculates it as follows:

We may start out with the fact that one unit of heat will raise 55½ cubic feet of air from 62° to 63° F., and can use these figures, no matter what the temperature and the steam are of the building to be warmed, or what outside atmosphere.

For low pressure steam—say about 5 pounds above atmosphere or by the gauge—the length of 4 inch pipe required for heating the air is found by multiplying the volume of air in cubic feet per minute, to be warmed, by the difference of the temperatures in the room and outside, and dividing by 336. The answer will be the length of 4 inch pipe in feet, and will be also about the number of square feet of pipe, as a 4 inch pipe has 12.57 inches circumference, hence but a very trifle over 144 square inches of surface per foot of length. (For 1 inch pipes the divisor required is 84 instead of 336.)

It will take one square foot of direct boiler surface, or its equivalent of floor surface, to keep a temperature of 60° F. in a room with steam at 5 pounds by the gauge, and the ordinary range of temperatures in and out of the room.

## Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.

## Painting Ironwork.

One of the greatest difficulties in the way of protecting iron surfaces by means of paint is the difficulty of producing a firm adhesion between the paint and the metal. When applied to surfaces that have been polished, the difficulty is not so great, though, even in this case, anything that will cause a more perfect adhesion is to be welcomed. It is when paint is applied to the rough surfaces of iron castings, and especially to those that have been scaled by the action of vitriol, that the difficulty of producing a perfect and permanent adhesion is found. In order to secure the best results, iron that has been vitrioled ought to be well washed and carefully dried before the paint is applied. If the articles are small, and will bear the application of a strong heat, they should be heated until oil applied to them smokes. They may then be brushed over with a thin coating of boiled linseed oil; and when this has become thoroughly dry, they may be painted. When the articles are too large, or when from other reasons it is impossible or inconvenient to heat them, the oil may be warmed before it is applied. A thin coat of hot oil will displace all adhering dampness, and stick to the metal so closely that no exposure to air or moisture will ever cause it to separate. To such an oiled surface paint adheres well; and when this process is adopted, we never find the paint falling off in large flakes, owing to moisture having crept into

further and further from her. Modern foliated carving should be based upon nature and nature's laws, as all carving, whatever may be its style, has been originally; but we may and should take ideas from all styles of architecture, but let us not confine ourselves or copy from any. Copy nature in the vast variety she gives us and never-ending beauty of form, and let us have a little of this variety in our architectural enrichments. Its leading characteristics should be elegance of form and beauty of light and shade, while retaining all the necessary quietness and repose necessary for its various positions as architectural enrichment.

## A Luxurious Bath.

A luxurious bath room in an elegantly appointed house on Fifth Avenue is thus described: A low draped doorway opens from the perfectly appointed bed room, with a white marble bath of veritable Eastern magnificence. A few steps on the softest of rugs, whose brilliant coloring is enhanced by the whiteness of the marble floor, brings one to broad steps, also of white marble, leading down into a square of perfect whiteness, about 6 x 6 feet in width and length and fully 4½ feet in depth. On the sides of the steps inclosing the bath stand beautiful palms in deep red bowls, and the windows, which run horizontally instead of vertically around the room, a few feet from the ceiling, are of softly-tinted stained glass. The bath arranged in this way is more comfortable than the ugly long tub, and it is vastly more picturesque. This little room was built to please the fancy of a young girl, and all its fittings are Eastern in character. A Turkish lamp hangs from the ceiling, in which gas has been introduced, and the walls are hung with Mohammedan "prayer rugs."

While only a few may be able to indulge in the luxury of a bath like that above described, still the house-keeper may take hints from the foregoing in the direction of adorning the bath room, which is too often neglected and allowed to remain bare and cheerless.

## Hardwood Finish.

An investigation among the newer houses in several of the outlying wards and suburbs of this city discloses what a remarkable change has been effected in respect to interior finishing within the past two or three years. A dwelling costing, with lot on which it stands, \$4,000, and upward, that does not contain hardwood finish in part or wholly, is a rare one. When a real estate dealer takes a proposed purchaser into a house for the purpose of showing off its merits, he calls attention to the hardwood casings, doors or floors contained in it as features of special merit, but nothing extraordinary. If the house has no hardwood finishing in it, that fact is considered by the agent as a subject for apology. It is often the case that the lower story is finished in hardwood, usually oak, while the chambers are equipped

with hard pine. In other instances the reception hall is finished in oak, while the residue of the structure is done in white or yellow pine, or both. The floors are usually of pine, though the kitchen and dining room in all good houses are generally floored with hardwood, maple and quarter-sawn yellow pine having the preference.

One house noticed was finished below with oak and in the second story with black ash. The last-named wood is not to be despised for finish, and could be profitably used much more than it is. So could white ash and soft elm. Gum does not figure as extensively in interior work as it should, though considerable is used. In one house finished throughout with hardwood the floors were laid with pine fencing flooring, the strips being six inches wide. It made the otherwise fine house look like a botch, though when the whole shall be carpeted, that appearance will be overcome. But a six inch pine floor can never be a good one unless plank instead of inch stuff be used. Nothing wider than four inches should ever be put into a floor unless it is in a stable or warehouse, where thick stuff is to be used. A floor of narrow strips has a solidity about it that one of six inch stuff can never have. The latter is apt to warp or huff, and at best yields to the tread. If there is anything in a house that suggests cheapness and flimsiness of build, it is a yielding, creaky floor or flight of stairs.—N. W. Lumberman.

THE most delicate tissues, grasses, and leaves can be plated with copper or other metals by electrolysis



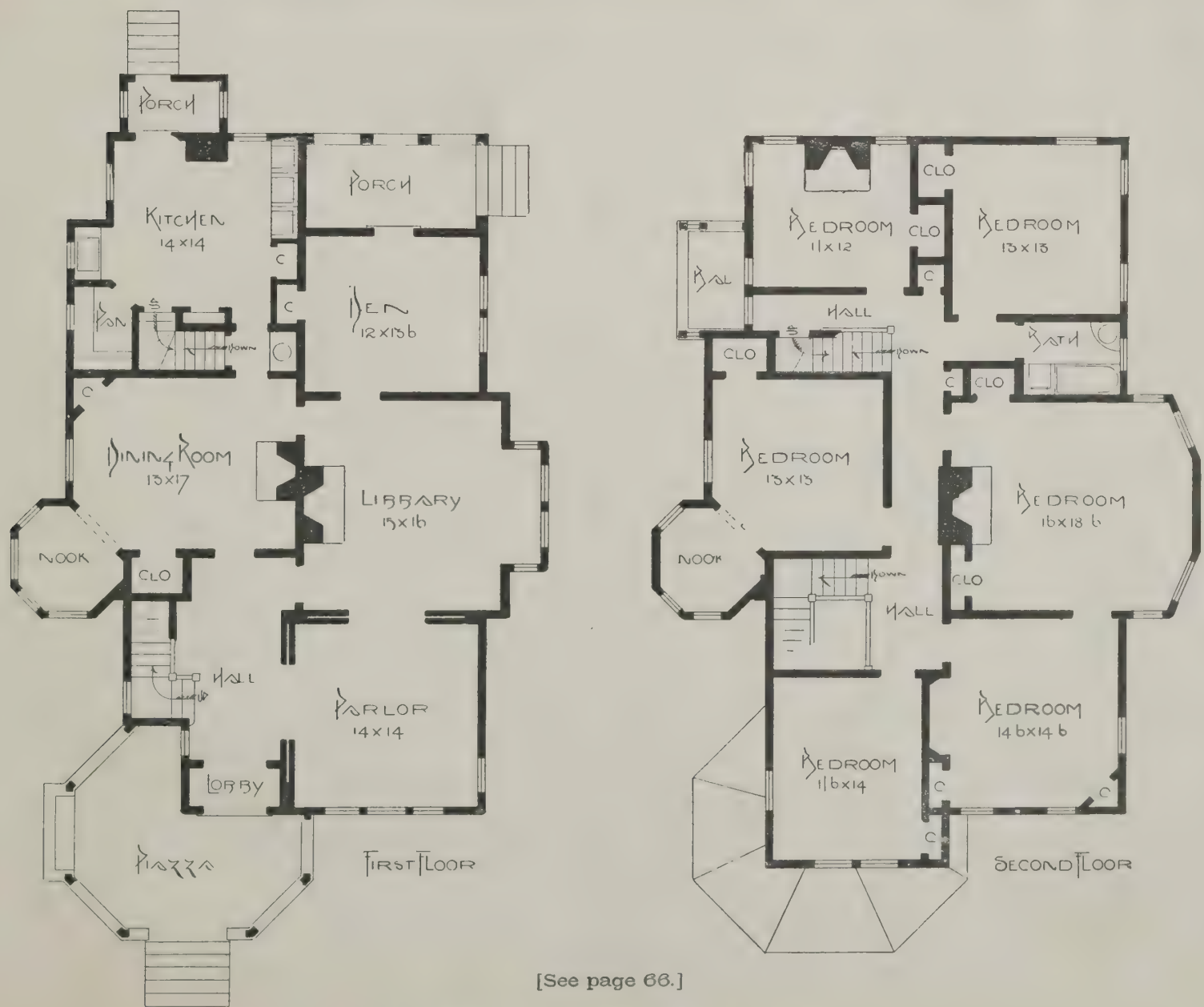
A DRAWING ROOM.

some crack and gradually producing a thin layer of rust between the paint and the metal. These remarks, of course, apply to metal that is exposed to the open air, and subjected to the action of frost, moisture and air. It is easy enough to protect metal that is kept within doors, in a dry place, and consequently needs no protection; but iron exposed to the elements is a different affair. These directions in regard to hot oil apply to wood quite as well as they do to metal. A coat of oil applied hot, and allowed to become thoroughly dry, is a powerful preservative, and makes an excellent groundwork for a subsequent coat of paint. *Iron Trades Advertiser.*

## Architectural Foliage.

How often do we see in modern foliage the very first and simplest law of nature totally disregarded, and foliage made to grow two ways—growing out at both ends at once. What can be more absurd? Yet it is done every day, more particularly in classic foliage. And as to any natural form or divisions in the leaves, it is never thought of; we are content to go on copying the leaves of the Greeks and the Romans without ever thinking it worth while to make them at once more natural, or even to get any more variety in form. We look upon it as architectural foliage, we are willing to accept the conventional forms as being the highest and most beautiful that can be attained, and we completely and purposely separate it and cut it off from the original source from which those old artists took their ideas. We shut out nature, and go on every day



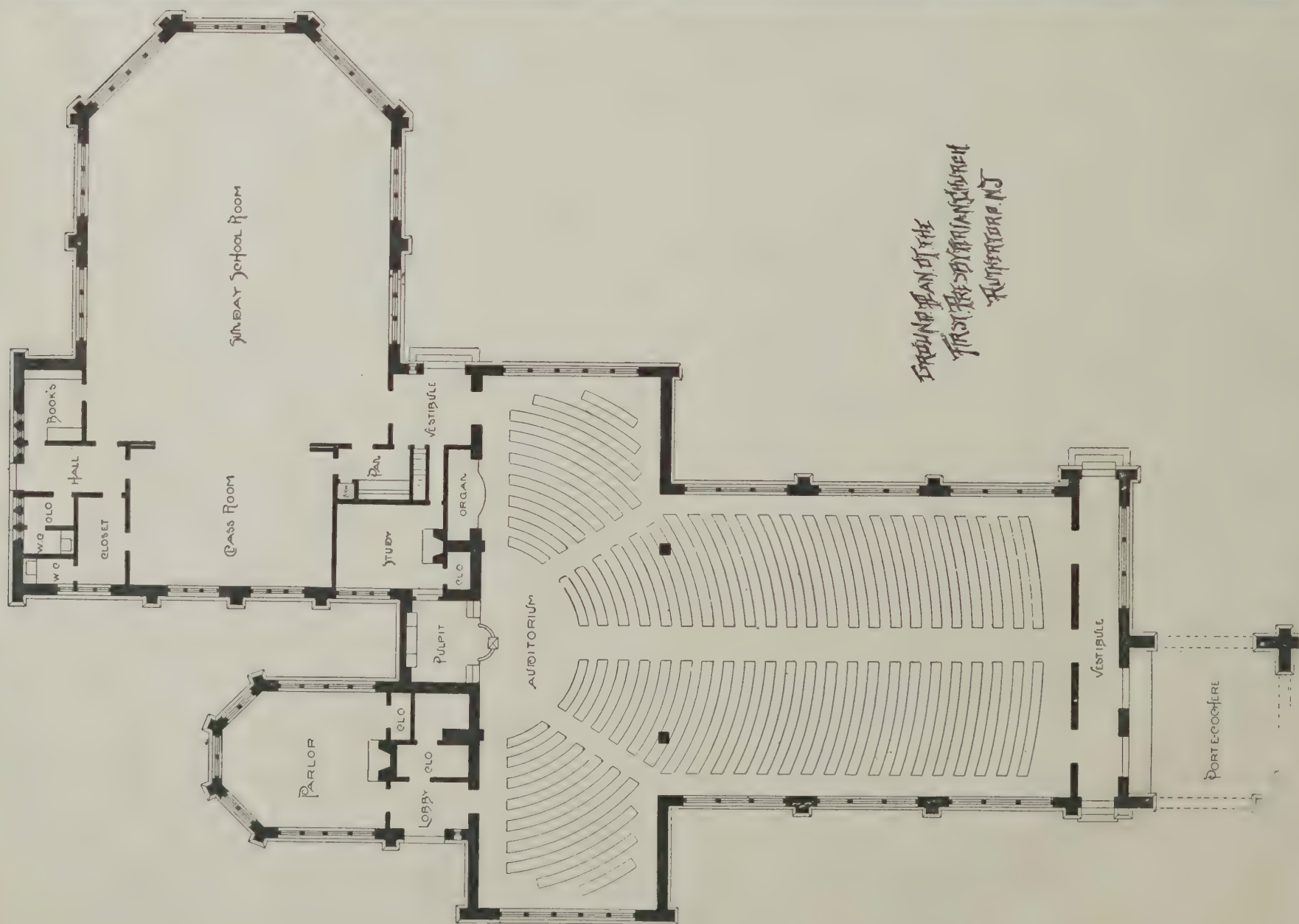


[See page 66.]

A DWELLING AT NEW HAVEN, CONN.







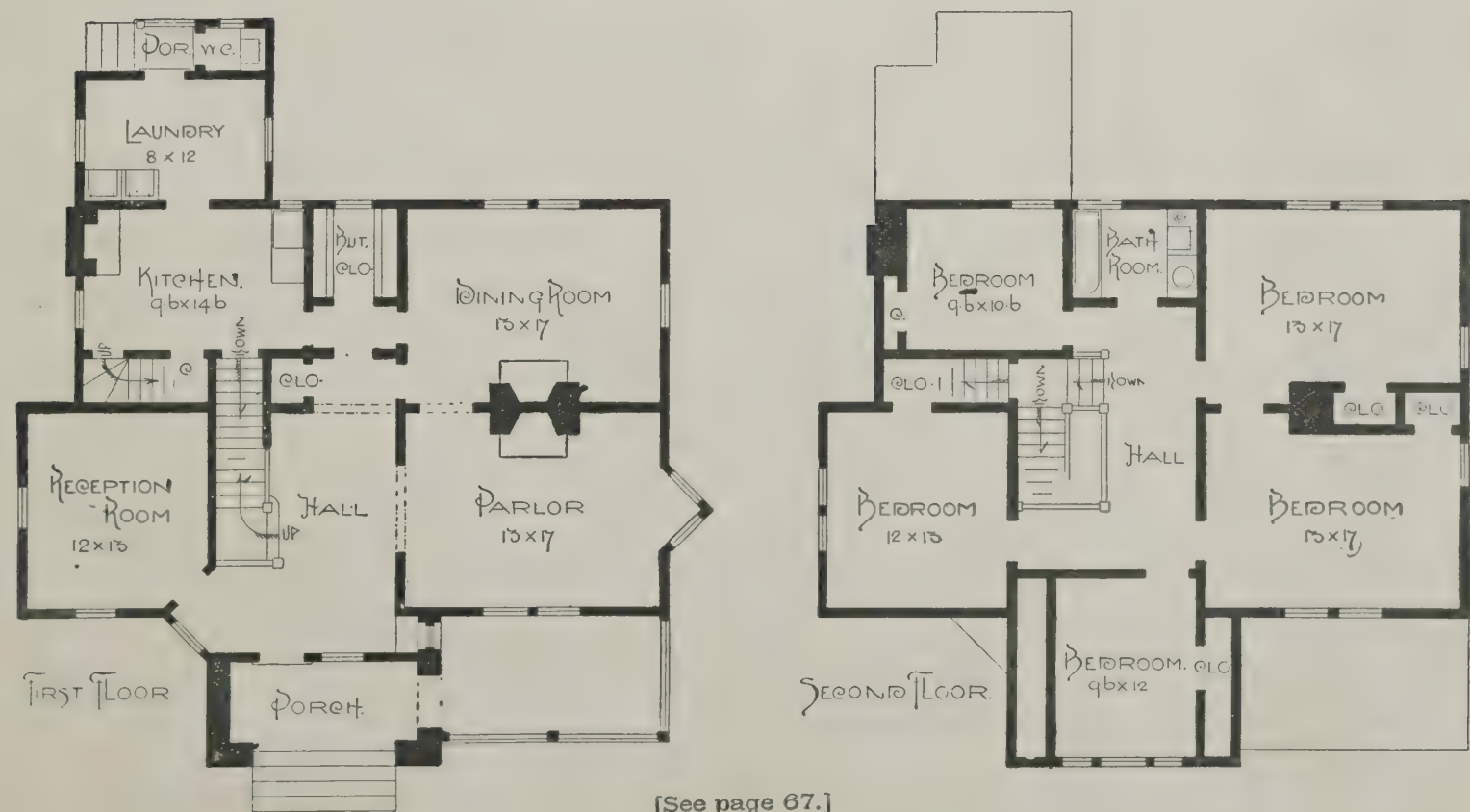
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[See page 66.]

A SUBURBAN CHURCH.





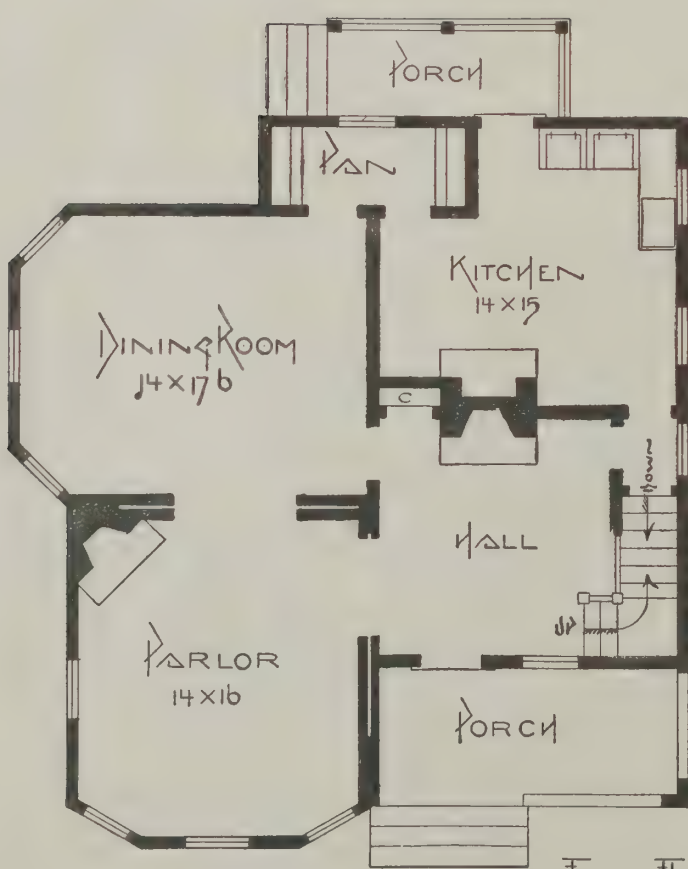


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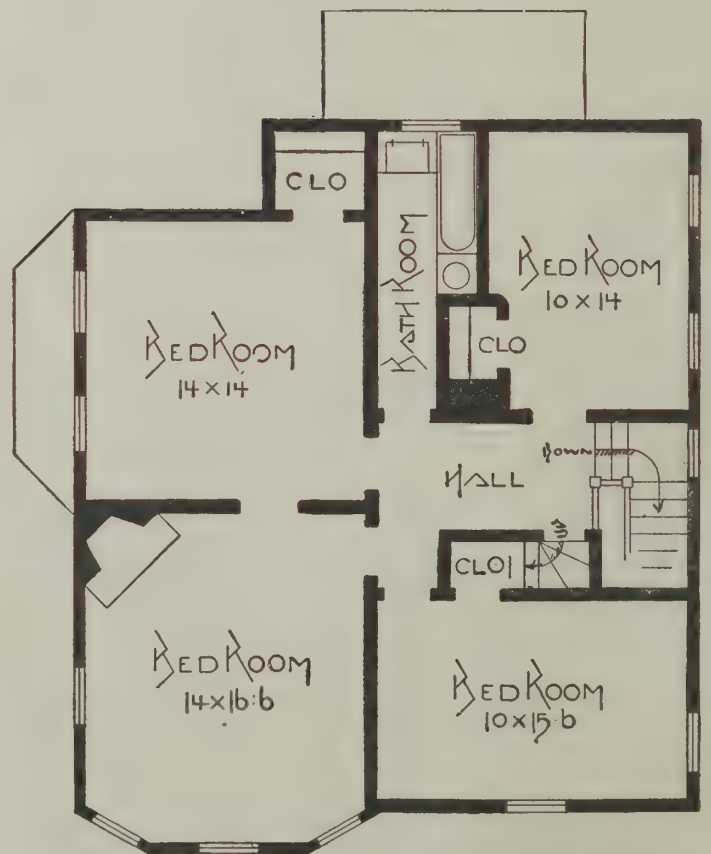
A GABLED COTTAGE.







FIRST FLOOR



SECOND FLOOR

[See page 67.]

A COTTAGE AT FANWOOD.





[FROM THE ARCHITECTURAL ERA.]

## THE NEW EMPIRE THEATER.

One of the most commodious play houses in America has just been started at the southeast corner of Broad and Locust Streets, Philadelphia, Pa., and will be known as the "Empire Theater." The general style of architecture must attract general attention from the fact that the construction will be on lines laid out on the modernized Moorish, both picturesque and unique, being totally unlike any other theatrical property in the country. Light buff brick will be used on the front, with ornamentation of sandstone from the quarries of Kentucky; the archways, doors and windows being elaborately carved or finished in rock-faced work. The roof is to be covered with Spanish glazed tiles, and the arches and balustrades across the front of the second and third stories of copper, highly and richly ornamented. Unlike the "House of Tudors," you will enter by three doors of massy oak, with beveled plate glass. The interior will correspond in tone with the decorations on the exterior; the lobby and vestibule floors laid in mosaics, while the floors and ceilings will be laid with papier-maché, *en relief*.

The manager's room and box office are to be on the left of the entrance; the box office and entrance partition, separating the lobby and vestibule, will be carved oak, with stained and plate glass. Two staircases reach the balcony level from the lobby. An entirely novel treatment will be used in the construction of the boxes and the proscenium, employing in their construction papier-maché, spindle work and fresco. The boxes will be overhung with richly ornamented canopies in the Empire style. The seating capacity will be about 2,100.

In case of fire, sixteen exits are available in an instant, as the building is to be opened on four sides and will be thoroughly fire-proof. The stage depth is 36 feet to the curtain line, and invested with every known appliance of modern science. Particular attention is being paid to the comfort of the profession in the arrangement of the dressing rooms in regard to situation and ventilation. The placing of seats will be such as to afford perfect ease and comfort to patrons, with liberal aisle space. Smoking and toilet rooms will be provided in advantageous parts of the house. Architect, Angus S. Wade.

## Decorations of the Hotel Metropolitan, London, England.

BY THE COUNTESS ANNA DE BREMONT.

The decorations of this magnificent hotel in a quarter of a century hence, when the mellowing hand of time has subdued its brightness and glitter, will be more beautiful even than it is in its present splendor, for the decorations are on such a scale of richness and solidity that they may well be calculated to endure the wear and tear of years. The marbles, tapestries and frescoes are of exceeding richness and superiority, while the carving in various woods could not be excelled. It is the most princely of all the palatial hotels that have sprung up in its wake within the last few years.

The entrance hall, with its splendid columns in various-hued marble, and massively decorated domed ceiling, frescoes and carvings, is truly imposing, and has no rival for sumptuous decoration in any of the hotels and clubs with pretensions to grandeur in London.

The same magnificent scale of decoration is carried out in the Grand Salle, which opens off the entrance hall. This noble room is long and lofty and divided on either side by a row of five columns in Corinthian design; these columns support and divide the ceiling into three; the center ceiling is subdivided into five panels, slightly domed, the surface of each highly ornamented by squares of foliated design in relief, and bound by a plain covered cornice which terminates in an elaborately carved frieze, which is carried along the entire ceiling and ornaments the side of the massive girders. The design is purely Renaissance, broken by consols and shield panels, and the color treatment of this superb ceiling is in cream and gold. The walls are divided by arched bays, filled in by lofty windows. The arches are richly decorated and gilded, and supported on pilasters of green and rose marbles. The walls between these arches are covered by a magnificent velvet brocade of a warm claret hue. The draperies of the windows and doors are of the same rich color, harmonizing and throwing into lovely relief the soft tints of the columns and ceilings. The whole is lighted by electrolights in clusters, and when illuminated, the effect of this splendid room is brilliant in the extreme, with its numerous mirrors reflecting the beauty of design—shimmer and glow of color in an endless vista. The oak dining room adjoining the Grand Salle takes its name from its decorations and finishings, which are entirely of that golden-hued wood. The walls display splendid tapestries of woodland scenes, and a splendid domed ceiling of stained glass and graceful fretwork of iron.

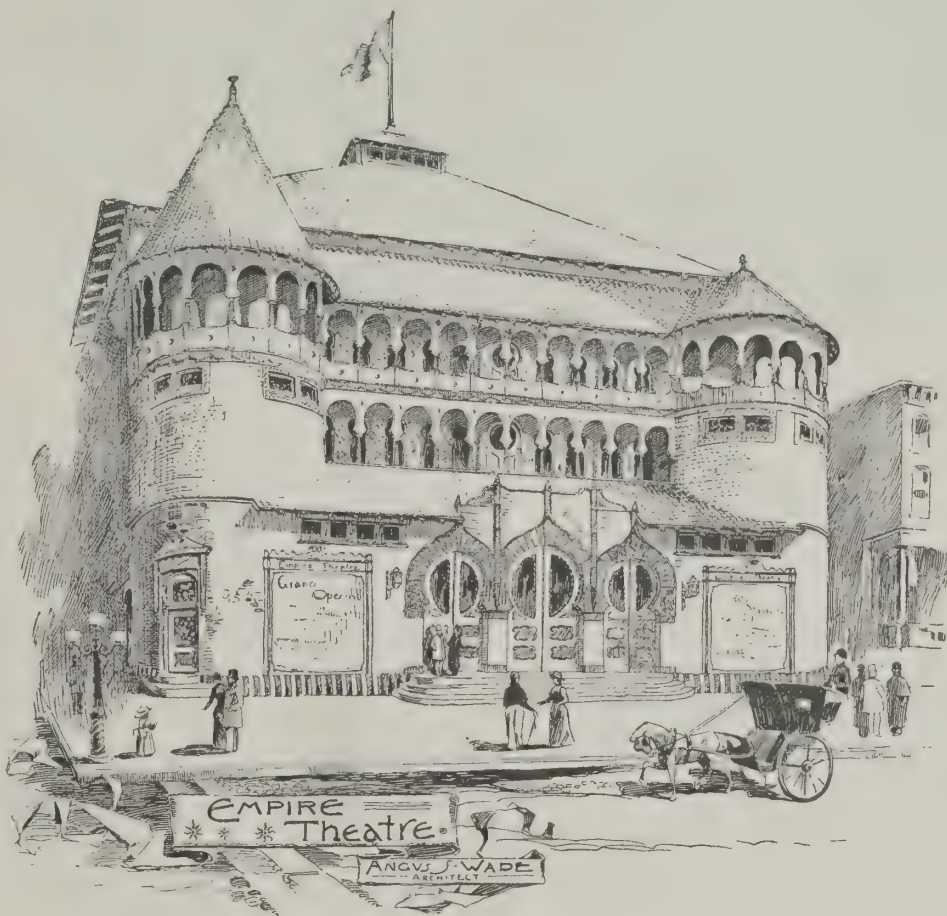
From the opposite side of the entrance hall opens the reception room, a lofty chamber superbly decorated after the style of Louis Seize. The ceiling is divided into three bays, each subdivided by irregular panels, the ceilings of which display lovely frescoes representing a hazy summer sky, flecked with clouds over which skim swallows. These beautiful ceilings are bound by a cornice of ornamented consols, finished by handsome frieze displaying festoons of flowers, and foliage of gold in relief, on a cream ground, terminates the whole, and forms the decoration on the sides of the broad beams, the face of which is ornamented by a chaste design in relief. Two Corinthian columns with shafts of a warm gray tone and corbels richly gilded support the girders. The walls display a frieze of frescoed panels divided by chastely decorated pilasters, in cream and gold; the frescoes are exquisitely colored and represent Cupids sporting over a blue sky with flowers and birds in their train. The walls below this lovely frieze are divided into bays and paneled pilasters; the bays are surmounted by Corinthian arches supported by pilasters of fluted columns, richly treated in tones of warm gray relieved by gold. These bays contain royal Windsor tapestries, representing views of Windsor, Sandringham, Balmoral and Osborne. The

portion in oak, the upper in squares of beveled crystal. Two bays occupy either side of these handsome doors, and are filled by stained glass casements, displaying busts of Shakspeare and Spenser. The drawing room adjoins this, and is treated after the French school of decoration in a truly sumptuous style. This room is of noble proportions and irregular in shape, one end being a complete oval; lofty windows light it on all sides. The ceiling is divided into eight distinct panels, the surface of each decorated with a simple and graceful design of leaf work in the tones of autumn foliage. The carved cornice is very handsome, the ground color being a warm cream, covered by a fretwork of slender mouldings in pale gold, covering the entire surface of the cornice, over which is a festoon of flowers and foliage in deep gold in relief, oval panels displaying charming frescoes of clusters of flowers in autumn tints, occupying the corners of the cornices. A splendid frieze highly decorated, and in tones of cream and gold, terminates the whole. The beams are also richly decorated and supported by a group of fine Corinthian columns, treated in white and gold. The walls are divided into upper and lower panels of great beauty and finished by a simple paneled dado. The upper panels form a splendid frieze, and are elegantly decorated in gold bearings in relief. In the center of each panel a circular panel displays a frescoed head of one of the great musical composers. The lower panels are covered with a rich silk of pale tea rose hue, and ornamented by sprigs of foliage and Grecian designs in soft, warm, autumn tints. These panels are incased in richly decorated mouldings of cream and gold. Mantels of exquisitely carved pink granite, and supporting lofty mirrors, ornament opposite ends of the room. A magnificent panel, representing Cupids discoursing music, occupies the space over the entrance doors. Groups of electrolights in tinted globes light this superb room. The corridors and smaller halls are richly treated in a combination of marbles, gilded fret work, and frescoing exceedingly striking and imposing in effect.

The chamber which deserves especial attention for its lavish beauty of decoration and elegance of design is the Marie Antoinette room—one would imagine one was in the heart of some palace of the old French kings in a chamber sacred to some royal beauty. The artist who designed and decorated this splendid hotel surely made this lovely room a labor of love. The ceiling displays a splendid piece of frescoing representing the rosy footed Aurora surrounded by dainty cherubs entwined with flowers and resting on a bank of fleecy clouds. To the east cherubs are sportively carrying lighted flambeaux and attending the morning star, while the rays of the dawn break the clustering clouds of the flying night. The entire walls and doors are paneled in gold and silver cloth exquisitely frescoed in graceful designs of flowers, fruit and foliage. The architraves of the doors support sculptured groups representing the arts; an alcoved recess is occupied by the windows in gilded casements; mantels of white and gold supporting the mirrors incased in frescoed frames of great beauty occupy opposite sides; this dream of the decorator's art is illumined only by the mellow light of clusters of candles. The harmonious blending of color, tone and design is perhaps the most striking beauty of this perfect room.—*The Plumber and Decorator*.

## Oldest Dwelling in the United States.

The old stone house in Guilford, Conn., is probably the oldest dwelling house in the United States. Since the date of its erection, in 1640, to the present time, it has been used as a dwelling, with the exception of a few instances in colonial times, when it did duty as a fort, and was a place of refuge for the settlers and their families when King Philip was on the war path. The house was built for Henry Whitfield, the head of the settlement, who was a minister of the church of England, and one of those who were called non-conformists. As usual with those early settlements, his followers were of his belief. The stone of which the house was built was quarried from a ledge about a mile from the site, and the records say was carted on hand barrows, which was no inconsiderable piece of work. The mortar used in building the walls is as hard now as the stone itself. With the exception of the roof, the house stands to-day just as finished by the builders two hundred and fifty years ago. The first marriage in Guilford was solemnized in this house, and history tells us that the wedding feast on the occasion consisted of boiled pork and peas.—*Alabama Beacon*.

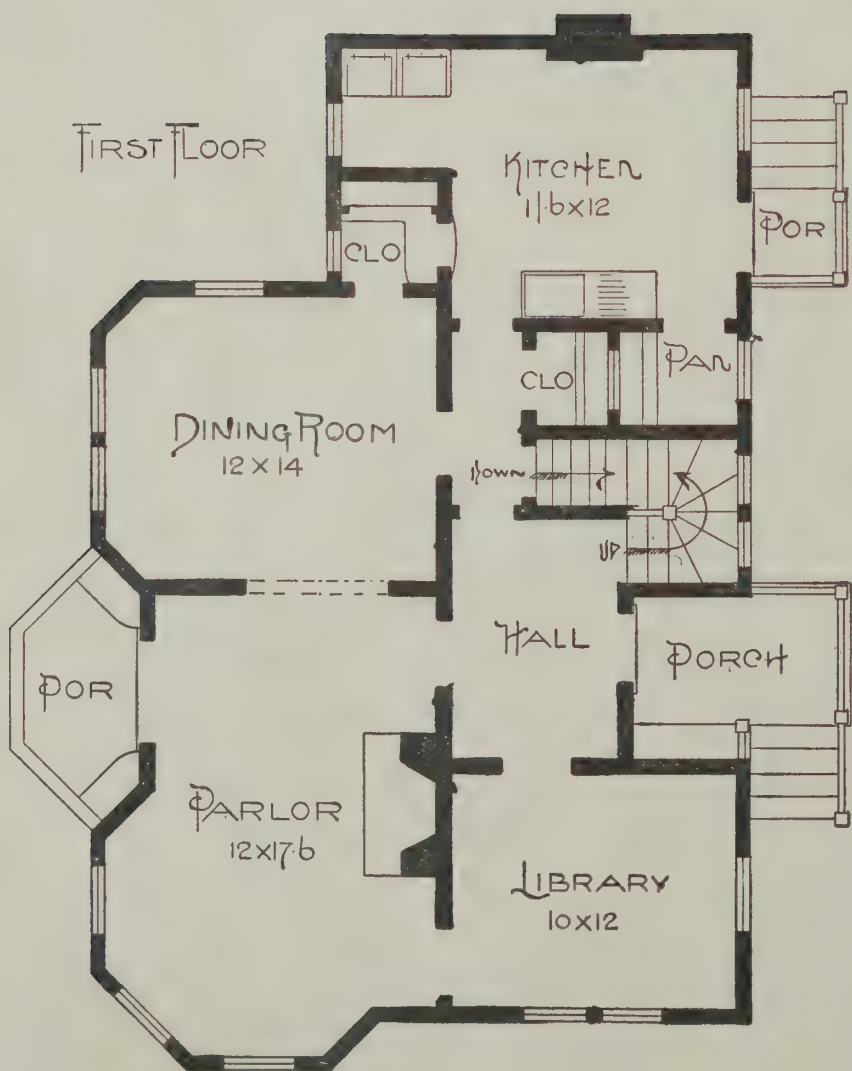


paneled walls between are elegantly frescoed in tones of gray, blue, salmon, relieved by black. An elaborately carved border with cap of egg and dart forms an inner frieze around the whole, while a low paneled dado, treated in fawn and gold, with gilded mouldings, forms an effective finish to the superb decoration of the walls. Two splendid mantels, magnificently decorated by carved mouldings in relief, and displaying over-mantels carrying out the same elegant design, occupy opposite sides of this interesting room.

A handsomely decorated corridor leads from the entrance hall to the drawing room and library. This corridor is broken on one side by an alcove facing the library, and most charmingly decorated, to represent a Moresque kiosk, with its swinging lamps, richly carved latticed windows, and low divan round the walls, forming a dado. The library is lavishly decorated in carved and polished oak, after the mediæval style. The ceiling displays a wainscoting of two shades in oak, arranged in squares and oblong panels. A splendid frieze and cornice supports this elegant ceiling. The design is somewhat after the Renaissance in carton pierre, the tones warm grays. An elaborately carved border of oak completes this cornice. The center walls are decorated by panels of embossed leather of a golden brown color. These panels are divided by flat mouldings of polished oak. The whole effect is extremely rich. A high dado of wainscoting in oak, decorated by a geometrical design, formed by raised mouldings of polished oak, completes this unique arrangement of frieze, wall and dado, as striking as it is original in effect.

The mantels are masterpieces of carved and paneled oak, the entrance doors are likewise paneled, the lower





[See page 67.]

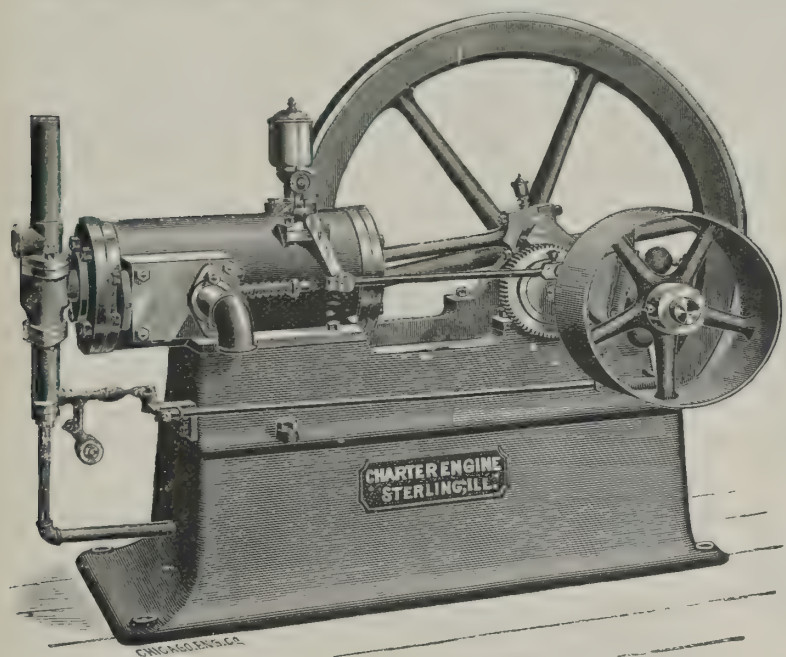
A COLONIAL COTTAGE.





## AN IMPROVED GAS ENGINE.

The motor shown in the accompanying illustration has had a large sale, and is in use throughout the United States and Canada, for almost every purpose for which power is required. It does not depend upon manufactured gas for its operation, as in this engine the products of petroleum, preferably gasoline, are used direct. The



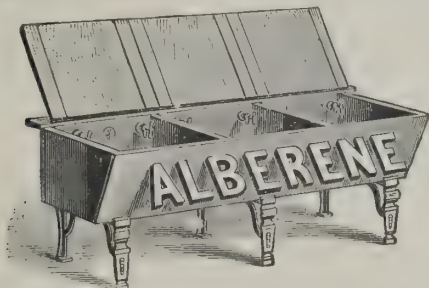
THE CHARTER GAS ENGINE.

gasoline or other hydrocarbon is kept in a galvanized iron tank, preferably located outside the building, with a cut-off to be used when the engine is not running. A quarter-inch pipe connects the tank with the iron cylinder of the engine, where the supply at one time is always limited to just sufficient for a single stroke of the piston, a governor so limiting each charge that only so much is taken as is needed to do the work. This engine is designed to use about one gallon of 74° gasoline per indicated horse power in ten hours.

The Charter Gas Engine Co., Sterling, Ill., are the makers of this gas engine.

## A SANITARY LAUNDRY TUB.

The fact that porous material used in the construction of laundry tubs, such as wood, cement, etc., is



poor economy is generally understood, but the danger to health arising from the absorptive nature of such materials is not so generally recognized. We herewith give an illustration of the "Alberene" Soapstone Laundry Tub, manufactured by the Albemarle Soapstone Co., of Nos. 4 and 6 Peck Slip, New York City. The soapstone of which this tub is made is positively non-porous and will outlast any other material used for this purpose. It has a dense, close grain, is handsome in color, uniform in texture, while in use the surface becomes as hard and smooth as polished marble. In a word, it combines "sanitary" qualities with durability and cleanliness, while the price has been reduced to a point which places it within the reach of all.

## Real Estate Investments.

Builders, and all engaged in the building trades, are perhaps more directly interested than any other class of people in the means for readily ascertaining the validity of titles to real estate. They do not have the time or the means, in the varied classes of work they have to perform, to make investigations as to titles which may be clouded or ownership which may be covered up, and yet it is of the utmost importance that they should have correct information. The subject has always been one full of difficulty, because some apparently slight legal technicality, not obvious to the lay mind, might destroy the value of a good deal of honest research, and involve the builder who depended upon himself in the matter, or upon an incapable lawyer, in irreparable loss.

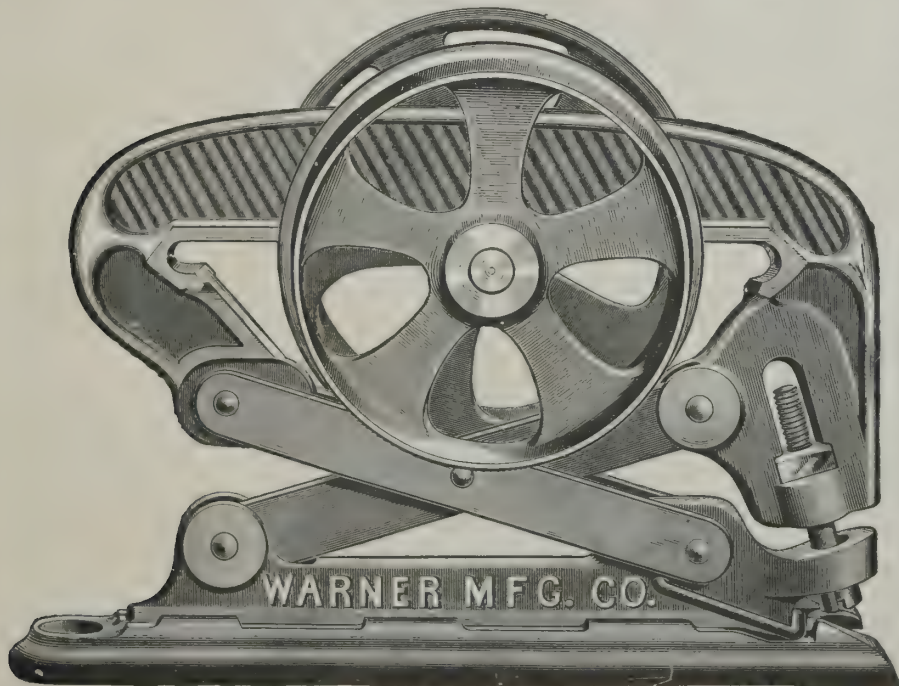
On this account, it is not to be wondered at that the matter of guaranteeing titles to real estate has, within a short time, grown to be a very considerable business, and one that has been especially favored by builders, for when one can show a guarantee that his title to a piece of property is good, such guarantee being from a company of known high standing and ample responsibility, then the builder knows that he is working on a solid foundation, and will not have to look out for quick sands. The German American Real Estate Title Guarantee Company, of New York City, therefore, working to this end, has obtained a well earned success, and become very popular. It often does not cost any more to look up the titles to a hundred pieces of property than it would cost to verify one of the lot, and therein lies the profit [of the business to the company, while enabling it to do the work at a small expense, while making the cost of insurance almost nominal. The company has, however, to employ the highest legal talent in verifying its researches, and use the greatest care in making its records, for any mistake which might be found to have occurred would fall upon the company, and not on the owner whose title is guaranteed. The company has, however, a cash capital of \$500,000 for such purpose, and its board of directors includes some of the wealthiest and best known business men of New York and vicinity. The President of the company is Mr. A. L. Souland; Vice-President, John A. Beyer; Secretary, S. B. Livingston; Treasurer, William Wagner.

## American Tin and Terne Plates.

The Messrs. N. & G. Taylor Co., of Philadelphia, who have been for more than eighty years importers and dealers in tin plate, write us that they are now fully prepared to make American tin and terne plates at their own works in that city, although they do not expect to start to supply the trade in general for a few weeks yet.

## AN EASILY COUPLED DOOR HANGER.

The illustration represents a form of door hanger which forms the subject of a recent patent issued to Mr. Warner, the hanger being manufactured by the Warner Manufacturing Co., of Freeport, Ill. It is very strong and simple, and provides for easily regulating the height of the door to give free movement. The door is coupled to the hanger, after the base plate is screwed in place, by simply sliding the parts together, an automatic gravity lock then securely holding the parts in place. This arrangement is adapted to give great satisfaction to practical carpenters and builders.



THE WARNER DOOR HANGER.

NEW YORK, Brooklyn, and Chicago put up a great many structures in 1890, and made alterations to many others. The three cities spent over \$158,000,000 in new buildings, and in New York and Brooklyn the cost of alterations amounted to \$9,000,000. Permits were given in New York for the erection of 3,537 buildings at a total cost of \$74,900,812, and plans were approved for alterations in 2,417 buildings at a cost of \$7,188,250. In Brooklyn 2,577 permits were issued for the erection

of 4,800 buildings to cost \$24,834,290, and for alterations in 1,275 buildings at a cost of \$1,633,290. In Chicago, over 50½ miles of frontage of new buildings were erected, and \$59,000,000 expended. This is the largest amount ever spent on new buildings in one year in that city, and it is expected that preparations for the Fair will keep up the boom.—N. Y. Sun.

## ARCHITECTURAL WOOD WORK.

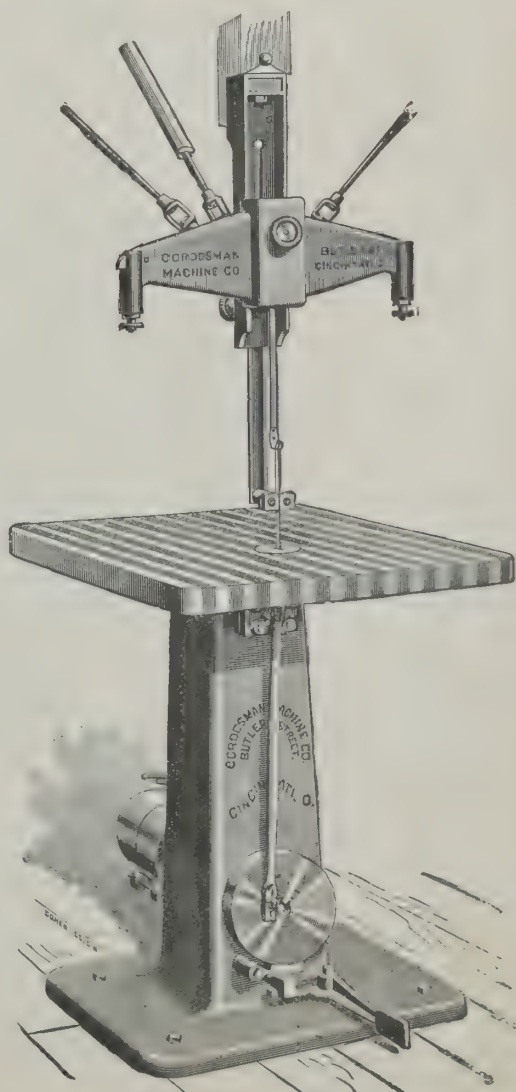
The illustrations show specimens of newels recently placed on the market by Anderson & Dickey, 43 Bristol



Street, Boston, Mass. This firm have a large number of patterns in stock and make a specialty of order work from architect's designs, executing architectural wood turning of all kinds and spiral moulding at short notice. They have issued a new illustrated catalogue of 52 pages, which they will mail free to any address on receipt of 25 cents.

## AN IMPROVED SCROLL SAW.

A new pattern of scroll saw, embodying improvements recently made, is shown in the accompanying illustration. It is designed for both light and heavy work, and the saws can be quickly changed for external and internal sawing. The table is 30 by 36 inches, and has a brass center plate, an iron table being furnished when desired. Adjustable slides, of gun metal, are placed beneath the table, and self-oilers lubricate the crosshead to which the lower end of the saw is attached. The machine has a new, simple, and efficient patent adjustable strain, by which the tension is made even throughout and may be increased or decreased at will. This saw is made by the Cordesman Machine Co., of Cincinnati, Ohio, whose business has been increasing so steadily of late that a new building is to be erected to accommodate its growth.



AN IMPROVED SCROLL SAW.



## IMPROVED SYSTEM OF FIRE-PROOFING.

The Gilbert & Bennett Manufacturing Co., of Chicago and New York, have perfected a simple system of fire-proofing by means of which wood timbers can be readily made safe by the use of mortar properly applied. Their system is adapted for the interior walls and ceilings of structures of all kinds, and especially for use around elevator shafts, stairways, areas, and hot air flues. It consists in the use of a wire lathing, which holds the mortar in place, in connection with a metal furring to set the mortar away from the wood and maintain an intervening air space. Our illustrations show the application of this system of fire-proofing on frame buildings, and as used on wood studs for partitions. Entire buildings have been constructed employing wire lathing with cement for the outer covering of wood framework and wire lathing with plaster for the inner, and these buildings have well stood the test of all extremes of climate. The wire lathing itself becomes so embedded in the mortar that a continuous surface is formed on its back as well as on its surface, while the stiffening rods of furring re-enforce the lathing, which is thus stretched tight and stapled securely. It will be at once seen that this system readily lends itself to any form of construction, around openings in walls or for any variety of architectural effect.

## THE NEW BOLTON HEATER.

The Detroit Heating and Lighting Co., feeling the necessity for a modification of their celebrated Bolton Hot Water Heater that would adapt it to large work, and having on hand several contracts for heating large buildings, have produced what they call their No. 20 series, an example of which we illustrate. It retains the special features of the regular Bolton heater, the top and bottom casting connected by a row of wrought iron pipes, the intervening space above the fire pot being occupied by pendent pipes, extending down just over the fire. The advantages found in this construction are vertical circulation and an extensive fire surface, all of which is exposed to the direct action of the fire. Its manufacturers assert that the Bolton contains less water in proportion to its fire surface than any other boiler on the market. They also claim a better proportion of fire surface to the grate surface.

The first of the new series, the No. 20, has a capacity for supplying 2,300 sq. ft. of radiation surface. The No. 25, which is the one shown in our illustration, consists of the two No. 20s united so as to form practically a double fire pot boiler, with a capacity of 4,500 sq. ft. The No. 30 consists of three No. 20s, similarly combined, and has a capacity of 6,500 sq. ft. of radiation.

An advantage of this construction over the ordinary "twinned" cast iron boilers is that when only one fire pot is in use, the heat may be made to pass over all the heating surface of the combined boilers, the direct draught damper (see small drop handles, indicated by arrow heads in cut) belonging to the fire box that is in use, leaving open the damper above the unused fire box. In order to find an outlet the draught must therefore pass among the pipes and over the entire heating surface of the boiler.

Full particulars can be obtained in the new edition of "Warmth for Winter Homes," published by the Detroit Heating and Lighting Co., and can be obtained from the home office, Detroit, Mich., or

from either of the branches at New York, Boston, Chicago, St. Louis, New Orleans, or Dallas.

## The Sturtevant System of Heating and Ventilating School Houses.

This system secures by mechanical means a positive and thorough circulation of the air without reference to the condition of the outer atmosphere. It produces a plenum condition of the air within the building, causes all leakage to be outward and prevents the possibility of vitiated air from water closets being drawn into the rooms. It allows of an instant change of temperature in individual rooms, without affecting that in the other rooms or changing the quantity of air admitted. The

ates with the base of each flue, and at their junction are provided with a special mixing damper under the direct control of the occupants of the room with which the flue connects. This damper allows of an instant change from hot to cold, or from cold to hot air. The quantity of air admitted is controlled in the usual manner by the inlet registers. The air is admitted to the rooms through wall register above head level in the inner wall and thence passes directly to the outer walls, is there slightly cooled, falls to the floor, passes back toward the inner wall, and escape through a register nearly beneath the inlet registers. The air in the halls is for convenience generally admitted near the floor. The ventilating registers and flues all connect with

ventilators upon the roof. In brick buildings, this system admits of the flues being built into the walls, thereby avoiding the expense of metallic distributing pipes. The system is capable of easy introduction in any school building of ordinary design.

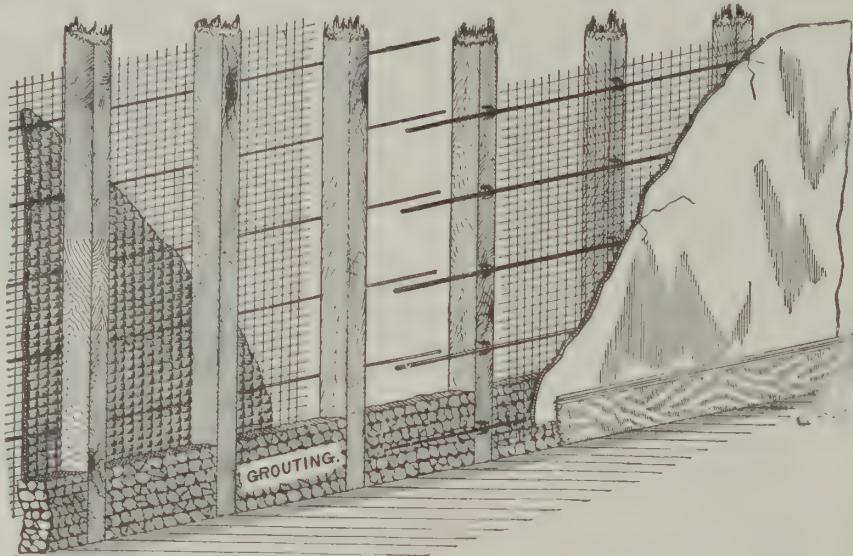
## Finishing Natural Woods.

The correct principle of finishing all kinds of wood is to use as little varnish or other foreign substance to produce a per-

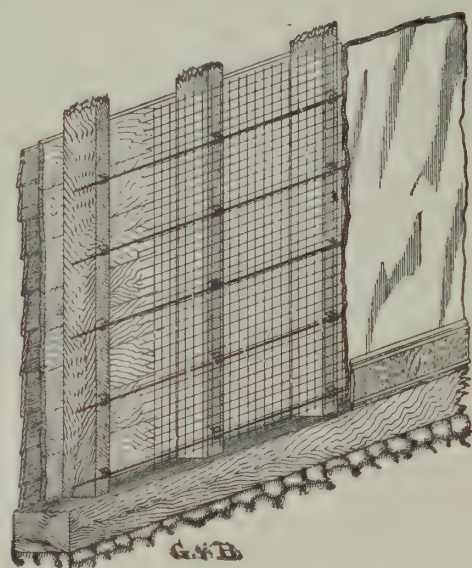
fectly smooth and elastic surface as possible. When developed by a proper finish, the variegated colors and grains of the different woods are shown to great advantage. For many years the greater portion of hard wood used in furniture and interior work in buildings, etc., was allowed to pass without proper finish, and the beauty of effect sought by the use of such woods was not fully obtained. The processes formerly used were tedious and expensive, and did not produce the best results, but, after a series of thorough experiments and investigation lasting for years, Mr. Wheeler, of the Bridgeport Wood Finishing Company, perfected an effective process, which is largely used by many of the leading manufacturing establishments with the most satisfactory results.

This process consists in rendering the surface of the wood even by filling the grain or pores to a plane with the solid parts with a hard, transparent substance, which gives at the same time a smooth polish to the compact parts, so that the varnish will not strike in and change the color of the wood, but, lying smooth on the surface, adds brilliancy and effect to the natural color. Among the advantages possessed by Wheeler's patent wood filler is that, by the application of the filler, a smooth and transparent surface is obtained, and upon which one or two coats of varnish will accomplish more than with double the number of coats of varnish by the old process. Over two tons of the Wheeler wood filler was used in the New York World building. The products of the Bridgeport Wood Finishing Co. are now largely used, and the company are adding constantly new goods to their list. Their English oak finish is used by the furniture manufacturers in Grand Rapids, Mich., and largely throughout the West. Their Breinig lithogen silicate paint for marine exposures and for use in all climates is said to give excellent satisfaction. Their catalogue will be forwarded to any address upon application, and gives full directions for applying the wood filler as well as the other preparations they manufacture.

Their principal office is at the factory, New Milford, Conn., Granville M. Breinig, general agent and superintendent, and they have offices at 240 Pearl St., New York City, and 211 E. Randolph St., Chicago.



GILBERT &amp; BENNETT'S FIRE-PROOF WOOD PARTITION.

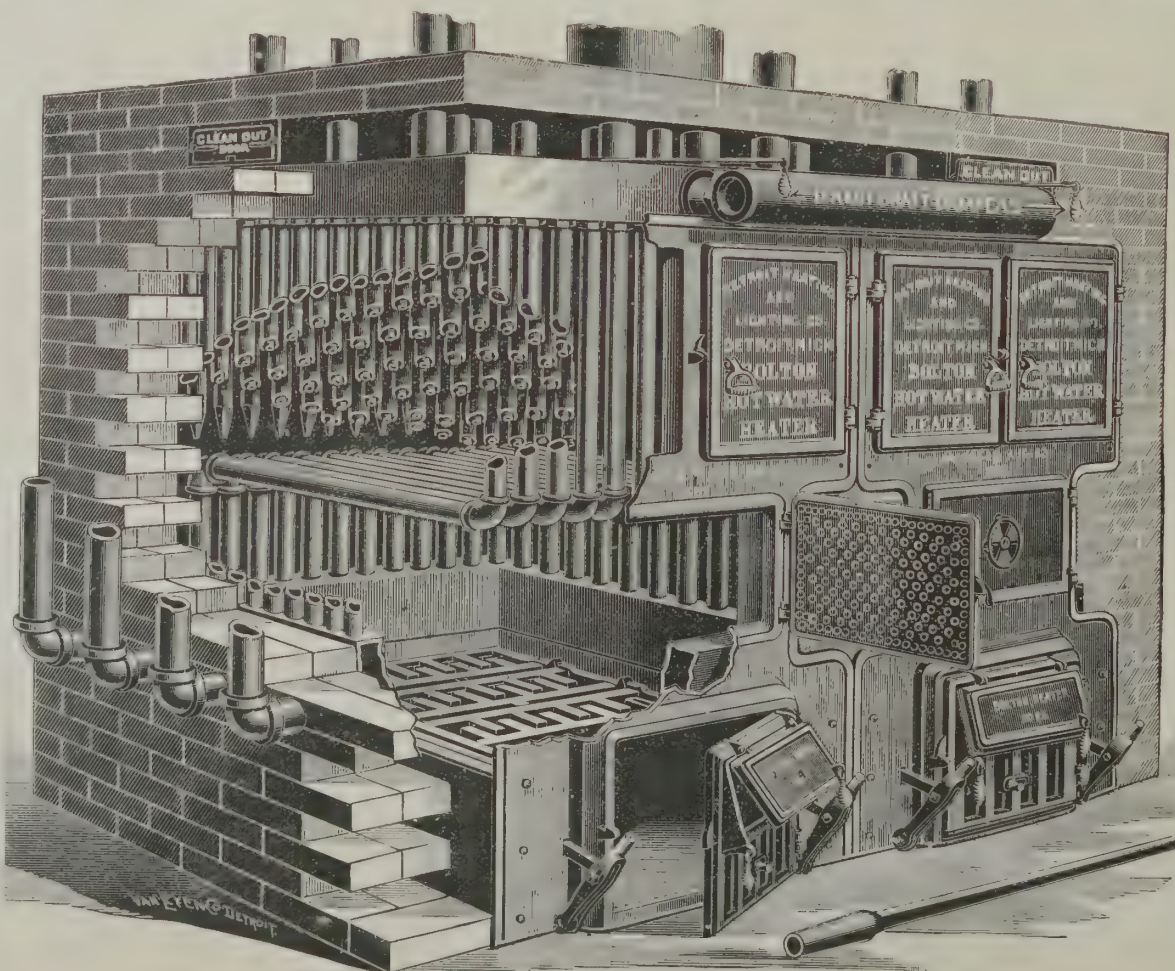


FIRE-PROOFING ON FRAME BUILDING.

entire heating surface is in a single heater, incased in a fire-proof jacket, and requires only about one-fourth the steam pipe necessary in other systems of heating and ventilating. There are no isolated radiators, or steam pipes, but the entire steam system is controlled by a few valves located within a few feet of each other; the danger from fire, leakage or freezing is avoided, and the entire system is under ready and immediate control. The air supplied can be taken from the purest available source.

The apparatus consists of a fan designed to run quietly and deliver a large volume of air with a small expenditure of power; a high grade engine for quiet and continuous running with only occasional attention; and a special heater through which the fresh air is forced into ducts connecting with the bases of the various heating flues. The apparatus is usually placed in the basement, and steam is supplied from a boiler of suitable construction. The entire apparatus is rendered automatic by the use of automatic water-feeding and damper-regulating devices.

The casing of the heater is so constructed in connection with a double system of air supply ducts that cold air can be forced through one system and hot air through the other. A cold and hot air duct communi-



THE NEW BOLTON HEATER.



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## EDITION.

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A RESIDENCE ON RIVERSIDE PARK, NEW YORK.—[See page 80.]





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### A RESIDENCE ON RIVERSIDE PARK, NEW YORK.

One of our colored plates in this issue presents a very striking residence erected for S. G. Bayne, Esq., on Riverside Park, New York City, N. Y. Architect, Mr. Frank Freeman. Another view of the same building is given on page 79.

Dimensions: Front, 45 ft.; side, 60 ft., exclusive of piazza. Height of ceilings: Cellar, 7 ft.; basement, 8 ft. 6 in.; first story, 11 ft.; second, 10 ft.; third, 9 ft. Underpinning and first story of New Jersey stone, called gray rock, trimmed with Lake Superior red stone. Second story is built of brick, made of special color, by the Perth Amboy Terra Cotta Co., who also made the terra cotta which enriches the window openings, cornice, etc. Front entrance is flanked on either side with clustered columns, and is fitted up with broad, massive doors of quartered oak. Roof is covered with Spanish tiles. One of the striking features of the exterior is the "Romeo and Juliet" balcony at second story, front. The interior arrangements, while rivaling in magnificence the elaborate workmanship and composition of the exterior, is carried out in a style quite independent of conventional ideas. The most striking feature of the inside is the staircase and hall opening into a suite of apartments, a vista of which is obtained immediately upon entering. The first floor is handsomely trimmed with cherry, elaborately carved. The staircase is a grand one, with carved newels, and is lighted by a massive stained glass window. The first landing has seats and fireplace. Hall has a paneled wainscoting, finished with a carved cap. The ceilings in hall and library are heavily beamed and ribbed, forming deep panels, the centers of which are covered with canvas and painted in tapestry effect. A nook with seats, separated by columns and spindle work, and a large open fireplace with tiled hearth and carved mantels, are the features of parlor, while the dining room is finished in colonial style and wainscoted in panels. Buffet and mantel have colonial columns running from floor to ceiling, with carved capitals and numerous little cabinets with beaded glass doors, that add to the antique effect of this room. Butler's pantry and rear hall trimmed and wainscoted with antique oak, and are fitted up with drawers, cupboards, bowl, and dumbwaiter to kitchen, also a trunk elevator from cellar to third floor. Second floor is trimmed with sycamore, finished in cherry. Bath rooms are paved and wainscoted with Italian marble, and are finished in a most expensive manner. Third floor trimmed with antique oak; contains four bed rooms and bath. Billiard room is located in tower (fourth floor), and is fitted up in log cabin style, the walls and ceiling being covered with quartered oak. Basement, trimmed and wainscoted with antique oak, is provided with breakfast room, kitchen, laundry, pantries, servants' bed room, and bath, all furnished replete in all their various appointments. Cellar contains furnace and other apartments.

Our engravings were made direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

### BRICK DWELLINGS OF MODERATE COST.

One of our plates in colors this month illustrates a row of five low cost dwellings, erected for Mr. Charles B. Pruden, at Newark, New Jersey. Dimensions: Width of the entire block 100 ft., and the depth, exclusive of porches, 43 ft. 6 in. Height of ceilings: Cellar, 7 ft.; first story, 9 ft.; second, 8 ft. 6 in.; third, 8 ft. Exterior walls, built of pressed brick. Bay windows and gables of wood, shingled and painted yellow, with bottle green trimmings. Roof slated and tinned. Cemented cellar under whole of building, contains laundry, furnace, coal and wood bins and store (cold) cellar. Vestibules have tiled floors. Halls parlors and dining rooms are trimmed with butternut, finished natural; doors and windows have beaded casings and turned angle blocks. Dining room in corner house has a fireplace, with tiled hearth and grate. Parlors and dining rooms are provided with hardwood mantels of excellent design. Floors throughout are of yellow pine, laid in narrow widths. Second floor of each house contains three bedrooms, alcove and bath, all fitted up in a first class manner, provided with large closets and trimmed with butternut. Corner house (only) has three bedrooms on third floor. Corner house cost \$3,350; other houses, \$3,000. Mr. Edwin Stewart Amerman, of Newark, N. J., architect.

Our engraving was made direct from a photograph of the buildings taken specially for the SCIENTIFIC AMERICAN.

### A DOUBLE RESIDENCE, NEW YORK.

We present on pages 82 and 83 engravings and floor plans of a double residence erected for Rev. Dr. Van Rennasalaer, on Washington Heights, New York City. The design is very picturesque, and it has many pleasing features, including towers, balconies, porches, bay windows, etc. Dimensions: Front, 51 ft.; side, 79 ft. 6 in. Height of ceilings: Cellar, 8 ft.; first story, 10 ft.; second, 9 ft.; third, 9 ft. Underpinning is built of granite laid rock-faced ashlar. First story built of Tiffany brick; second and third stories are of wood,

covered with shingles and painted tile red, with bottle green trimmings. Roof covered with Bangor red slates. The main halls are trimmed with ash. The ceilings are heavily beamed and ribbed, forming deep panels. The staircases are ornamental ones, the posts of which extend to ceilings; the spaces between these posts are filled in with spindle work. The halls are also furnished with a nook, seats and fireplace, the latter having a tiled hearth and a hardwood mantel. Parlors are well lighted and are trimmed with mahogany; each is provided with fireplaces, furnished with tiled hearths and elegant carved mantels of mahogany, with mirrors, etc. Dining rooms are trimmed with butternut, and each is provided with fireplaces, with china closets on either side. Butlers' closets are fitted up replete. The second and third floors of each house contain three bedrooms, large closets and bath room, all trimmed with cherry and fitted up in the best possible manner. Attic contains the servants' apartments and storage. The kitchens, laundries, furnace rooms and other apartments are conveniently located in cellar. Cost, \$20,000 each. The late Mr. Carl Pfeiffer, of New York, was the architect.

Our engravings were reproduced direct from photographs of the building, taken specially for the SCIENTIFIC AMERICAN.

### A DWELLING AT NEW HAVEN, CONN.

We present in our illustration, page 84, a dwelling erected for Mr. E. S. Perry, at New Haven, Connecticut. Dimensions: Front, 34 ft. 6 in.; side, 50 ft. 6 in., exclusive of piazza. Height of ceiling: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Underpinning and first story are built of brick, with brown stone trimmings. Second story is covered with clapboarding and shingles painted red, with bottle-green trimmings. Roof slated. The plans are excellent. Principal rooms on first floor are trimmed with ash, finished natural. Hall contains an ornamental staircase, with turned newels, balusters, etc., and is lighted by a stained glass window. Fireplaces have tiled hearths and facings, and hardwood mantels of exquisite design, with beveled plate mirrors, etc. First floor of hardwood, laid in narrow widths. Kitchen and its apartments are trimmed and wainscoted with North Carolina pine, finished natural with hard oil. These apartments are replete in all their appointments. Second floor contains four bed rooms, large closets, den and bath room, all trimmed with whitewood, finished natural. Three bed rooms on third floor. Cemented cellar, contains laundry, furnace, etc. Cost, \$8,000, complete, including furnace, range, gas fixtures, interior decoration and everything complete ready for occupancy. Messrs. Allen & Tyler, architects, Benedict Building, New Haven, Conn. Our engraving was made directly from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

### A COLONIAL COTTAGE.

Our engraving, page 85 illustrates a colonial house, erected for Mr. C. W. Macfarlane, at Elm Station, Pa. The design, although somewhat modified, is taken from an old New England house. The special features are its piazza and balconies, which are liberal.

Dimensions: Front, 29 ft. 6 in.; side, 51 ft., not including piazza. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; third, 8 ft. Underpinning of field stone laid a random. The first story covered with stucco work, splashed with pebbles and painted colonial yellow, and the second story shingled and painted a similar color, with white trimmings, by which a delightfully quaint effect is obtained. Roof, shingled, is stained with red and green creosote, which is laid on in a manner to produce a mottled effect. The plans are excellent, and they show many large rooms, conveniently arranged, and each having a connection with the hall. Hall, spacious, is trimmed with ancient oak, and contains a very handsome staircase, with newels turned out of same, also a window on landing, glazed with stained glass. Parlor and library are finished in ivory white (china gloss) with a little gilt, and each is provided with an open fireplace, with white tiled hearth and artistic wood mantels. Dining room is trimmed with oak. Kitchen, laundry, and pantries are wainscoted and trimmed with yellow pine, finished natural, and are all replete in their appointments. Second floor contains three bedrooms, provided with an unusual amount of closet room, a den and bath room, the latter wainscoted and fitted up in the best possible manner. Three bedrooms and storeroom in attic. All these rooms are trimmed with white pine and painted in colors. Cemented cellar, contains furnace and other apartments. Cost \$5,300 complete. Mr. C. W. Macfarlane is the architect. Our engraving was made direct from a photograph of the building specially taken for the SCIENTIFIC AMERICAN.

A SPECIES of porous terra cotta tiling is rapidly coming into use. Sixty thousand dollars' worth of it was recently put into one building in New York City. Experts say, however, that as far as fireproof floors are concerned, alternate layers of plank and cement form the most impenetrable of constructions.



## A COMFORTABLE HALL AND STAIRCASE.

The illustration shows a portion of a dwelling house interior designed and drawn by the Hayden Furniture Co., of Rochester, N. Y., and New York City. The treatment will be readily recognized as that of the modern Renaissance order, allowing sufficient latitude to the designer to display his taste in arrangement, construction and detail, while he is held closely enough to the conventional to give his production the character and style most sought after at the present time.

The company presenting this illustration is one of high standing in its business, and well and favorably known throughout the country as manufacturers of fine furniture, mantels, and interior woodwork. Within the last decade this company has completed many elegant dwelling house interiors in different parts of the country, not only supplying the interior woodwork and mantels, but also the furniture, decorations, and draperies. They are pioneers in the manufacture of wood mantels for the trade, of which they always carry in stock a large variety, comprising a broad range in style and price.

Special attention is given by this company to the quality and condition of the wood used. It must be

the latter wainscoted and replete in the usual way. Three rooms in attic. Cemented cellar contains furnace. Hardwood floors. Windows glazed with plate glass. Cost \$7,200 complete, including range, furnace, grading, fence, etc., ready for occupancy.

Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

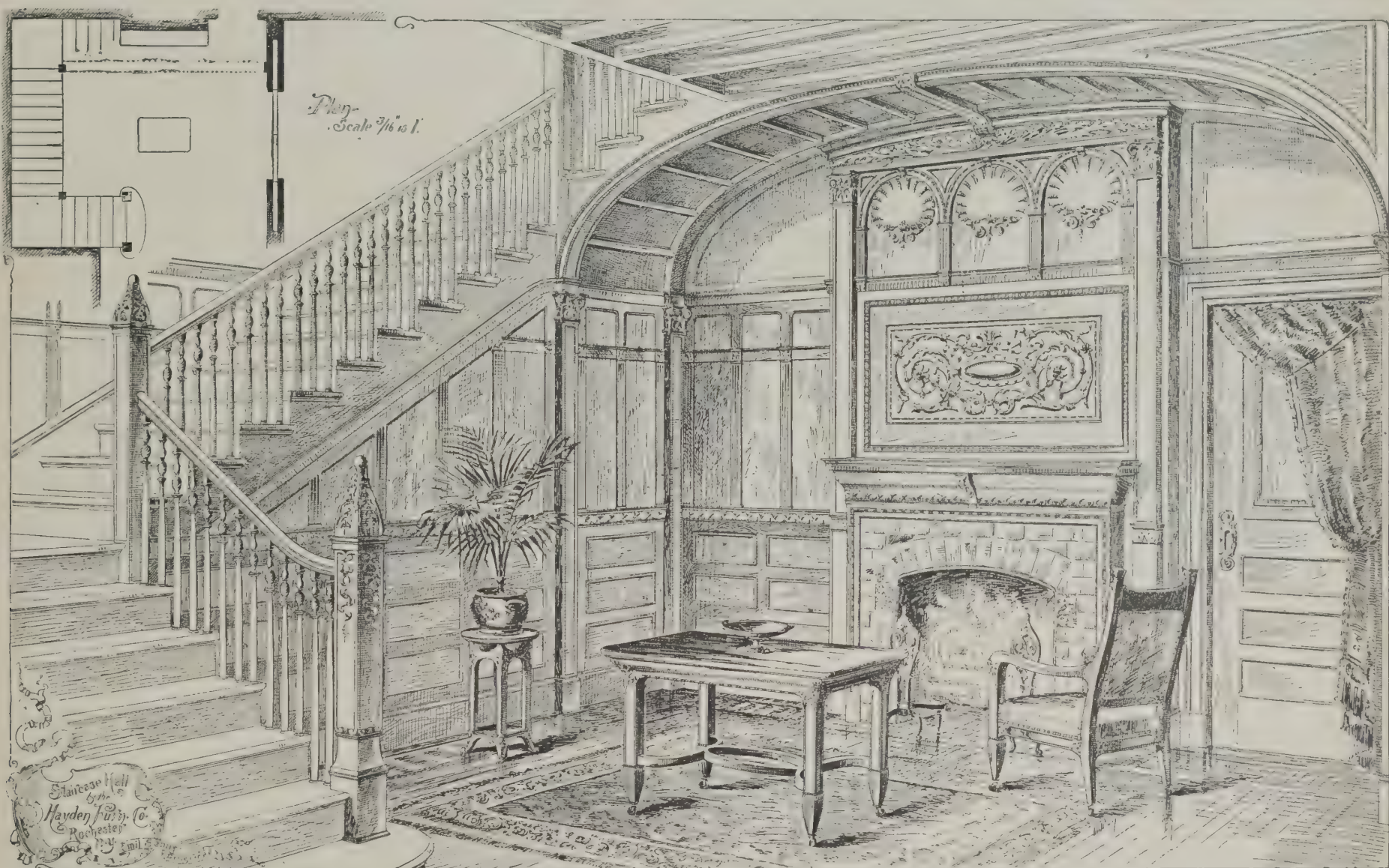
## A PENNSYLVANIA COTTAGE.

Our engraving, page 87, illustrates a tower house recently erected for Mr. C. W. Macfarlane, at Elm Station, Pa. Dimensions: Front 28 ft., side 40 ft. 6 in., not including piazza. Height of ceilings: Cellar 7 ft., first story 9 ft. 6 in., second 9 ft., third 8 ft. 6 in. Underpinning and first story built of rock-faced field stone laid up at random. Second story covered with shingles, painted red. Roof covered with Bangor slate. The rooms are all good sized, and each is connected with hall. The trim throughout is of white pine, finished natural with hard oil. Hall contains an ornamental staircase turned out of ash. Fireplace in library is furnished with a tiled hearth and a hardwood mantel. Rear stairs are private to second floor. Kitchen, laundry, and pantry are wainscoted and fitted up re-

bedrooms, den and bathroom, all replete. There is ample space in the attic for storage. Cemented cellar contains laundry. Cost complete \$2,000 a house. Mr. Charles P. Baldwin, of Broad Street, Newark, is the architect. Our engraving was made direct from a photograph of the buildings taken especially for the SCIENTIFIC AMERICAN.

## A COTTAGE AT ELM STATION.

Our engraving, page 90, presents an English cottage, erected for Mr. C. W. Macfarlane, at Elm Station, Pa. First story is built of field stone, laid at random, and the second story is covered with shingles and painted red. Roof is covered with Bangor slates. The plans show a convenient arrangement of rooms that are provided with all the improvements. Hall contains an ornamental staircase, with newel, posts and balusters turned out of ash. The interior throughout is trimmed with white pine, and the hall, parlor and library are painted ivory white, while the other rooms are finished natural with hard oil. Library has a fireplace, with tiled hearth and mantel. Kitchen, laundry and pantries are wainscoted and fitted up complete; the former having a private staircase to second floor. Second



A MODERN INTERIOR—A COMFORTABLE HALL AND STAIRCASE.

perfect in texture, and handsome in figure and character, while it is both thoroughly air and kiln dried. The cabinet work, carving, and finish are also of the very best order.

Correspondence with all who are building or anticipate building fine residences is solicited by the company.

## A COTTAGE AT WAYNE, PA.

This picturesque house, shown in the engraving, page 86, has been erected for George W. Childs, Esq., in his Villa Park property, at Wayne, Pa. F. L. & W. L. Price, Philadelphia, Pa., architects. Dimensions: Front, 53 ft.; side, 35 ft. Height of ceilings: Cellar, 7 ft.; first story, 9 ft. 6 in.; second, 9 ft.; attic, 8 ft. 6 in. Underpinning and balustrade to piazza are built up with rock-faced field stone laid at random. First and second stories are covered with shingles and stained senna. Roof, shingled and painted red. There is a large, well shaded piazza at front. The rooms are arranged in an irregular manner, but are so disposed as to give a pleasing effect. Hall, trimmed with oak, contains a staircase of similar wood, carved in an elegant manner. Parlor, library, and dining room are finished in antique oak. The rest of the house is trimmed with white pine, finished natural. Library has a pleasant nook with seats, and an open fireplace with hearths and facings of tiles and a mantel of oak exquisite in design. Kitchen, laundry and pantry are wainscoted and fitted up complete. Second story contains five bedrooms, with large closets and bath room,

plete with all the necessary appointments. Second floor contains four bedrooms and bath room. Bath room is wainscoted and fitted up in a first class manner. Three bedrooms and store room on third floor. Cemented cellar contains furnace and other necessary apartments. Cost \$4,600 complete. The proprietor, Mr. Macfarlane, was the architect. Our engraving was made direct from a photograph of the building taken specially for the SCIENTIFIC AMERICAN.

## HOUSES OF LOW COST.

We present on page 89 a row of low cost colonial houses, erected for Mr. H. F. Coffin, at Roseville, New Jersey. Dimensions: Front 155 ft., side 30 ft., not including porches. Height of ceilings: Cellar, 7 ft.; first story 9 ft. 6 in.; second, 9 ft. The exterior has a quaint but pleasing appearance, and a study of the plans will reveal an entirely new disposition of the rooms, which is equally as satisfactory as the regular way. Underpinning of brick, laid in red mortar. The exterior throughout is sheathed, papered and clapboarded, the latter painted colonial yellow, with white trimmings. The interior throughout is trimmed with white pine, painted in delicate colors. Halls contain ornamental staircases turned out of ash. Parlors have fireplaces furnished with Baltimore heaters, and dining rooms have similar fireplaces provided with grates, all fitted up with artistic slate mantels. Kitchens are wainscoted and provided with range, sink, pantries, etc. Second floor of each house contains three

floor contains four good sized bedrooms and bath room, and third floor is provided with two bedrooms and storeroom. Cemented cellar contains furnace and other apartments. Cost about \$4,000. Mr. C. W. Macfarlane, the proprietor, is the architect.

Our engraving was made direct from a photograph of the building, specially taken for the SCIENTIFIC AMERICAN.

## PATENTS.

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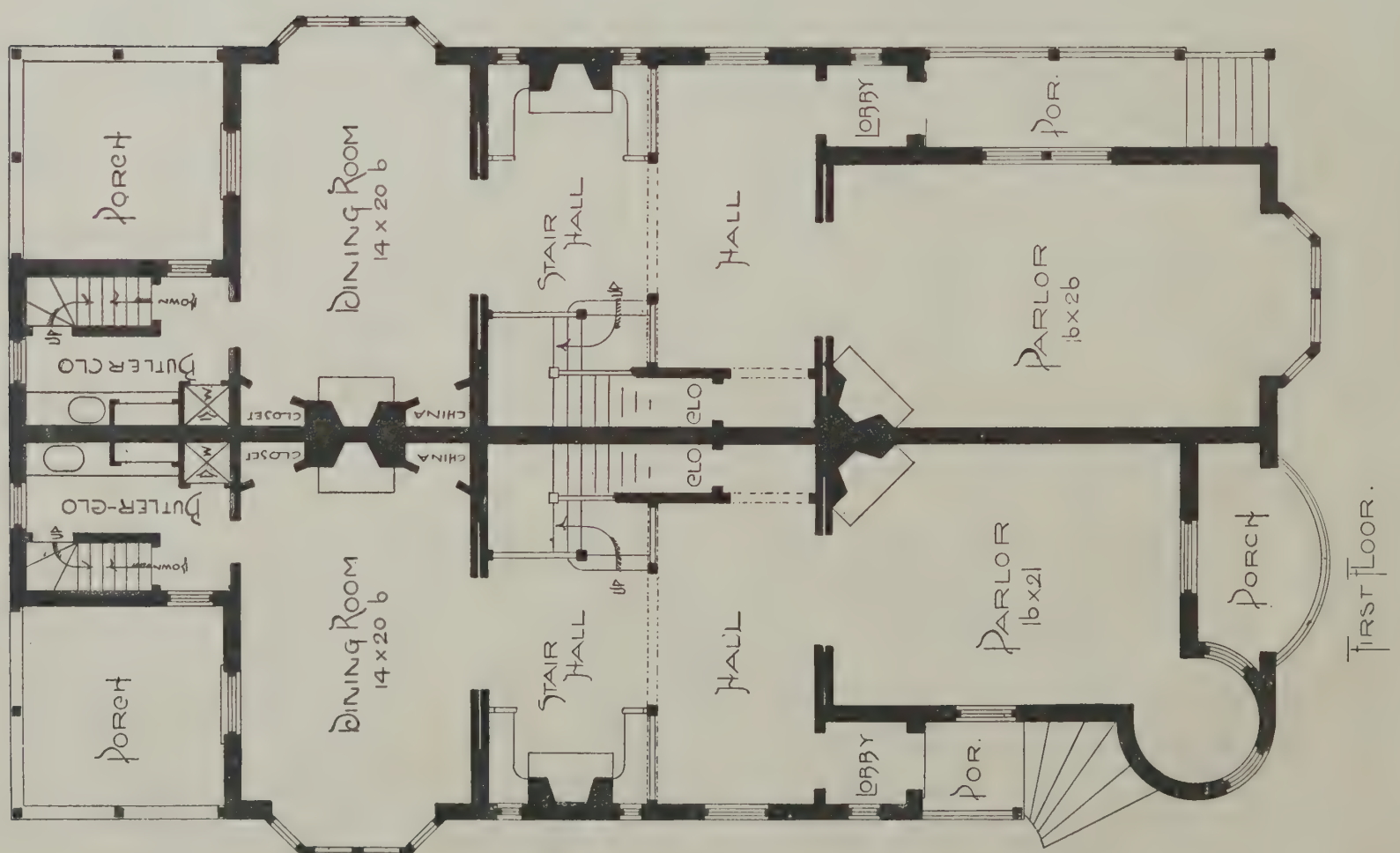
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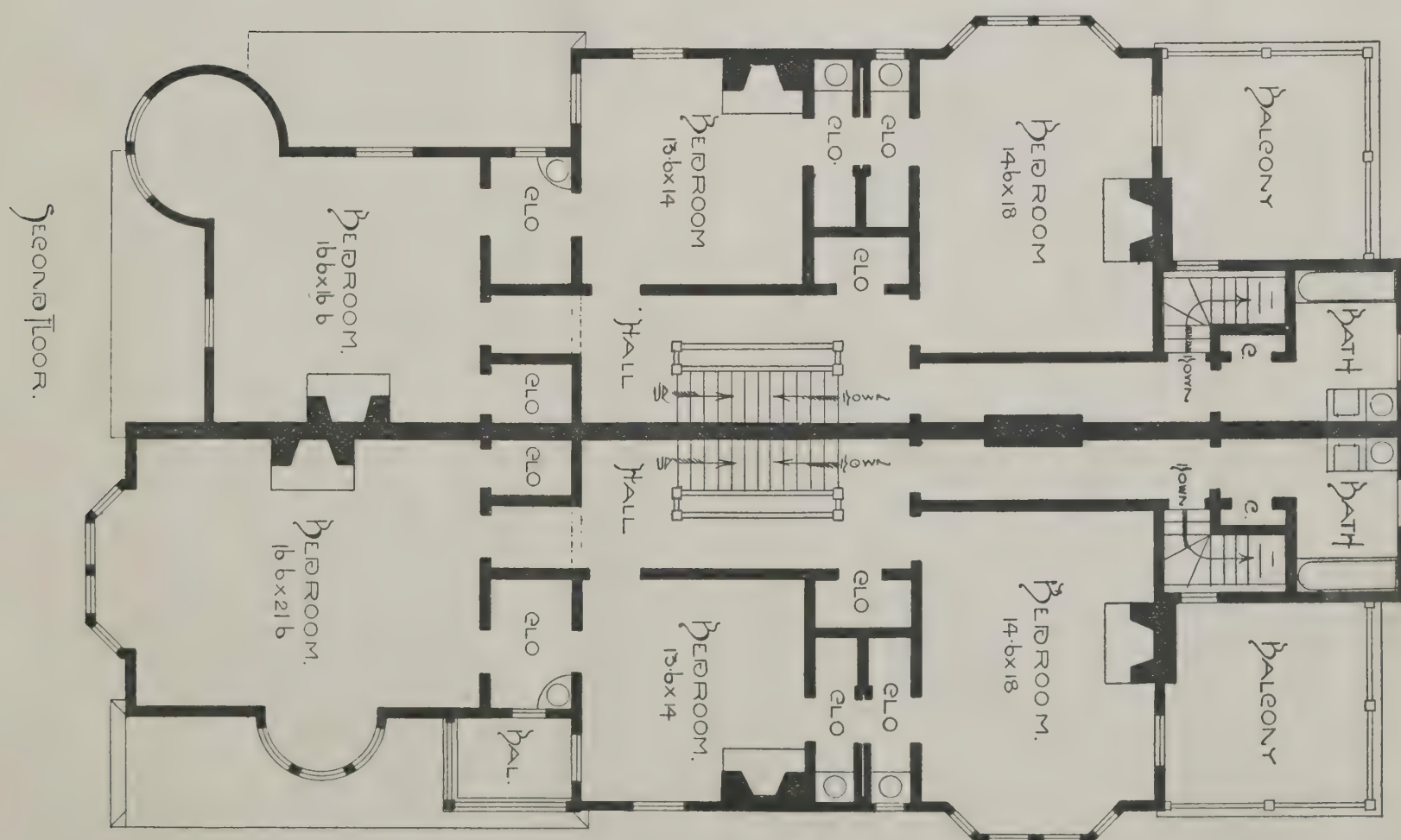


[See page 80]

A DOUBLE RESIDENCE, NEW YORK.



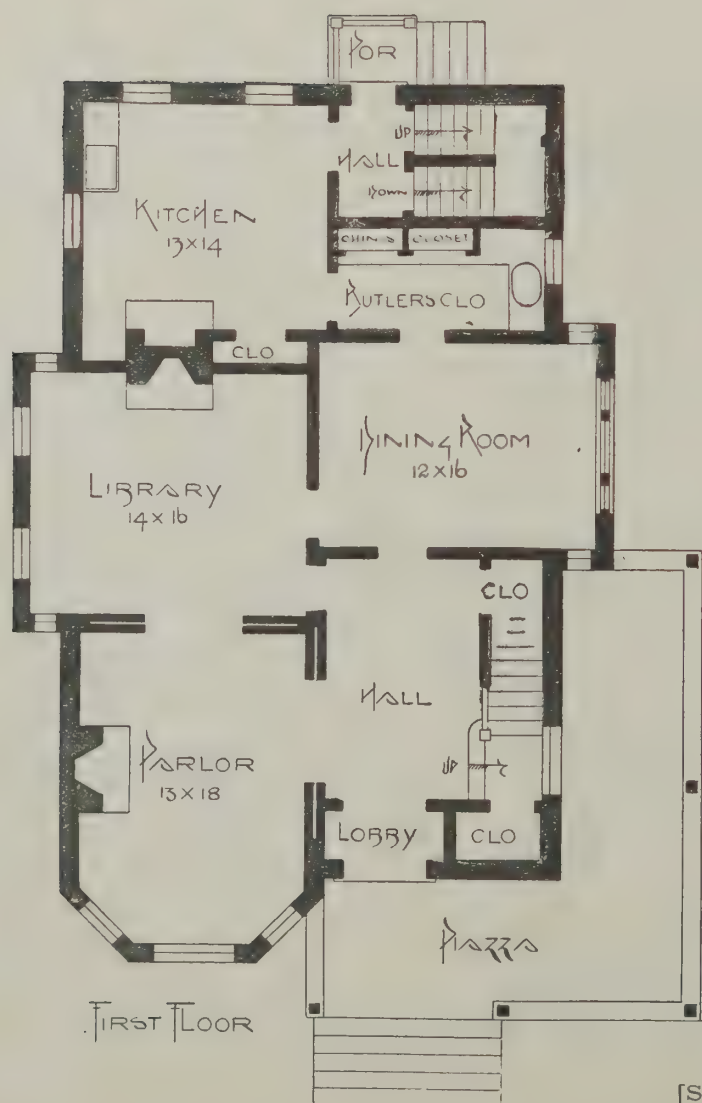




[See page 80.]

A DOUBLE RESIDENCE, NEW YORK.



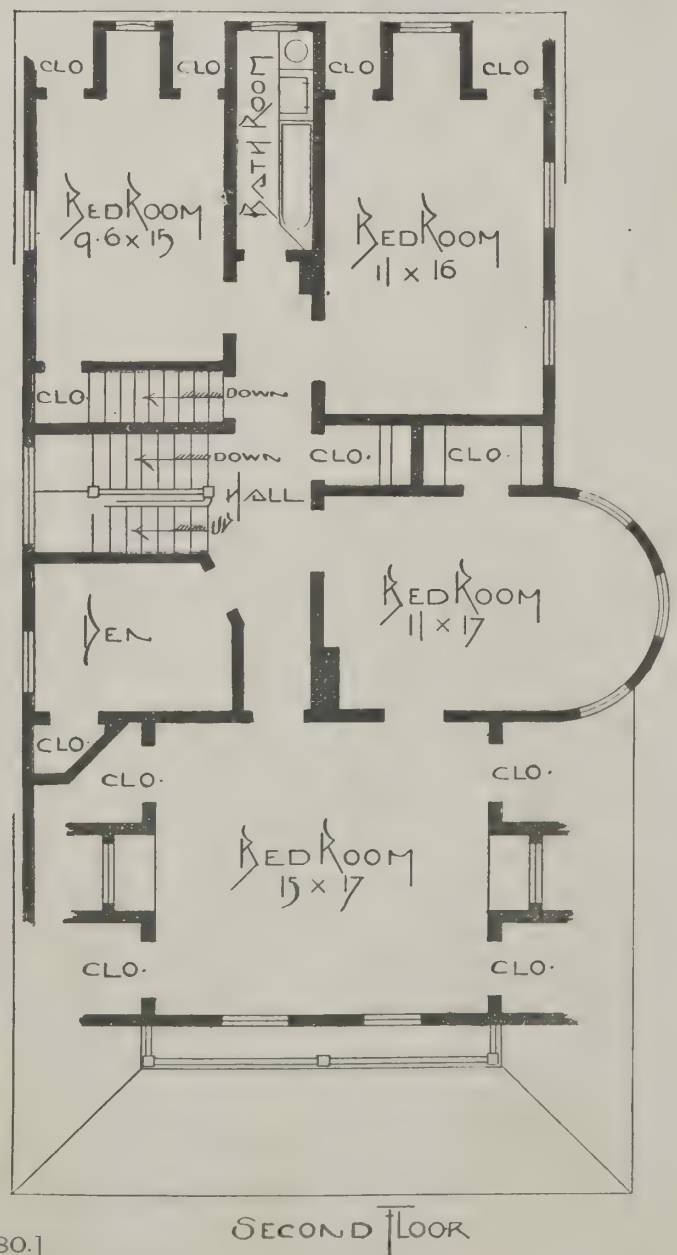
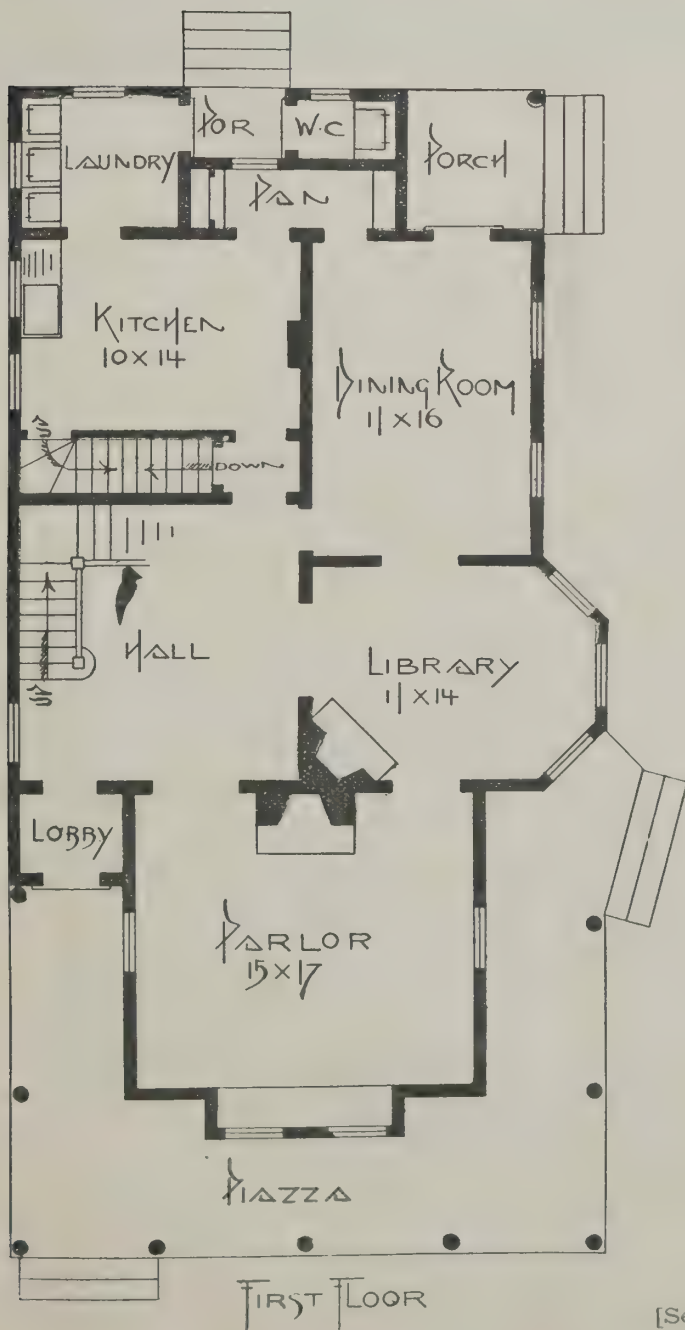


[See page 80.]

A DWELLING AT NEW HAVEN.







[See page 80.]

A COLONIAL COTTAGE.

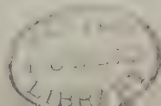




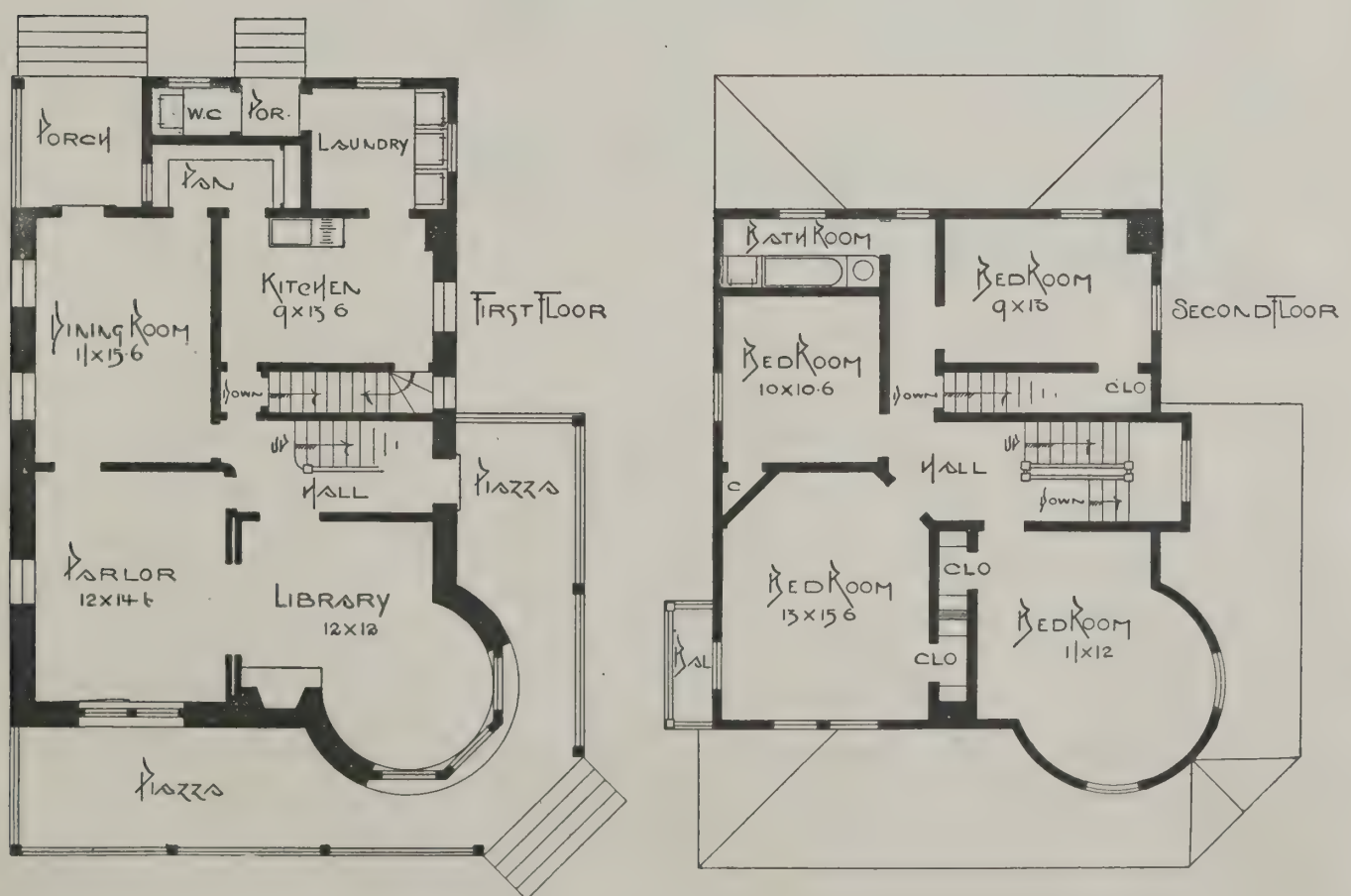


[See page 81.]

A COTTAGE AT WAYNE, PA.

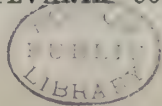






[See page 81.]

A PENNSYLVANIA COTTAGE.





Simplicity in Furnishing and Decoration.

If only people could be guided into simple habits and ideas as regards so-called comforts and ornaments, we should not only be more likely to develop nobler art, but also to secure less of toil and trouble in the care and keeping of the useless gimerackery with which the homes of all, from noble dukes to well-to-do tradespeople, at present abound.

As a rule, it may be safely admitted that rooms are too much furnished, and that the doors, windows, fireplace, floor, walls and ceiling have too little competent care bestowed upon them. Were the constructive features of a room properly looked after, much furniture and upholstery would be as needless as it is troublesome to keep in order and move about. And this brings up another important point in house furnishing too often forgotten—the question of dust. Dwellers in town are particularly subject to this all-prevailing evil, an evil arising not altogether from without.

Houses are more or less vibratory, especially where there is heavy street or train traffic in the vicinity, and we have not yet cleared out our stock of smoky flues. So that in addition to paying particular attention to the fitting of doors and windows, we would urge the selection of only such furniture as may be easily moved about, or so raised above the ground as to leave at least 9 inches clear space underneath. Avoid useless side tables and cabinets, which are so often dragged in for no other purpose in the world but to carry "art emporium" rubbish. Remember that all furniture beyond what is really necessary for comfort and convenience only provides so many more traps wherewith to catch the dust. Avoid all woolen or fluffy material in such upholstery as it may be deemed necessary to have. These two or three simple hints can be acted upon by nearly everybody. To those whose means admit of it, we would suggest the use of thin parquet over old floors; upon such a floor only one or two rugs, in lieu of the usual carpet, would be needed, which should be of a close, hard texture. Then we would substitute the grand or semi-grand piano for the dust-attracting cottage instrument where possible, and abolish forever the hideous practice of covering our furniture with all kinds of drapery and frippery. —British Architect.

Weight as a Test of Strength in Timber.

Mr. B. E. Fernow, chief of the Forestry Division, Department of Agriculture, Washington, D. C., states that the weight of wood depends on its fiber, and that varies with the amount of air, water, resin and pigment contained in its cells. If weight depended on fiber itself, its specific weight would depend on the proportions of cell wall to cell space—pure wood fiber, whether in light wood, such as poplar, or heavy wood, such as oak, being about the same.

The presence of water, air, etc., in fiber depends on such varying conditions that the same kind of wood may vary in weight, and even in the same stick be irregular, according to its seasoning. Weight is, consequently, not a stable basis for strength. Strength really depends on the quality, form, and arrangements

of the cell elements, and upon its structure and grain, and since the grain on the cross cut, that is, the appearance and number of annual rings for a given area, is much more readily ascertained than the weight, which is changeable according to methods and conditions of seasoning, it is a much more reliable criterion of quality, and especially of cross-breaking strength.

The greater the proportion of strong fiber to the light and loose cell elements on a given area, the heavier and stronger the wood, other conditions being equal. These fibers are shown on a cross cut of oak or pine by the darker color, and in general their denser structure is at once apparent. In these woods the fibers are found crowded together on the outer part of the annual ring, which is known as "summer wood," while the cells with a thin wall are mostly found in the inner part of the ring, known as "spring wood." All things being equal, the wood containing a larger amount of "summer" in proportion to "spring" wood must be heavier and probably stronger also. Hence the experience that coarse-grained, broad-ringed oak is heavier and presumably stronger. There are, however, exceptions to this, as in forests where of

two oaks one is broad-ringed and another narrow-ringed wood, in which a moist subsoil has contributed to open pores and looser cells. It is then necessary, in judging oak timber, to rely, not on the weight alone, but on the grain together with the weight, the same rule being probably operative in most other kinds of timber.

FARM HOUSE OF LOW COST.

A correspondent of the *Rural New-Yorker* sends to that paper sketches of a farm house recently built by him in Steuben County, New York, which sketches we here reproduce as an example of economy in building. The estimate given does not include the cost of hem-



FARM HOUSE OF LOW COST.

lock timber used, as the correspondent said he did not notice how much he put in. He says he furnished meals for the workmen, and this item is not included. But, with these omissions, it is evident the house was economically built:

COST.	
Cellar wall work.....	\$38 00
Material.....	0 00
Pine and hardwood lumber.....	150 00
Shingles.....	56 00
Lath.....	10 75
Brick.....	9 00
Plaster for walls.....	45 00
Lathing and plastering.....	33 48
Carpenter work.....	150 00
Windows, doors and blinds.....	95 18
Trimnings.....	14 62
Paint.....	34 00
Eaves troughs.....	26 00
Miscellaneous.....	23 00
Total.....	\$695 03

To take mildew out of white duck window awnings, treat the awnings with thin fresh whitewash. It will cover, not remove, the mildew.

Architect of the Woman's Building.

Miss Sophia Hayden, of Boston, the architect of the woman's building of the Columbian Exposition, in Chicago, is a graduate of the Massachusetts Institute of Technology, and is the only woman who holds the diploma of this school, although several women have taken their partial courses. General Francis A. Walker, president of the institute, says of Miss Hayden that she is perfectly competent for any demands in the calling she has chosen. "Miss Hayden, who will be called upon to undertake the construction of the building," said General Walker, "is entirely competent to build a railroad bridge, if necessary." General Walker went on to speak of the thoroughness of the course Miss Hayden had pursued in taking up the mathematical side of architecture, including the study of materials in strength and duration, the details of heating and ventilation, and the business question of contracts.

Miss Hayden is the daughter of Dr. George Hayden of Jamaica Plain. After graduating from the Institute of Technology last June, Miss Hayden became the teacher of drawing in the Eliot Industrial School.

The style of design selected by Miss Hayden is, in accordance with the conditions of the competition, the Italian Renaissance, with a colonnade on each story and a pavilion on each end. There is no dome. The outline is classical. Miss Hayden will go to Chicago at once.

Miss Howe, the lady who won the second prize, is also a student of the School of Technology, and a resident of Cambridge, but is employed in Boston as a draughtsman in the office of Messrs. Allen & Koanway, architects. Miss Howe had studied four years at the Museum of Fine Arts before taking the two years' special course in architecture at the Technology. Miss Howe receives the second prize of \$250.

Miss Hayden gets the first prize of \$500, besides the work of architect and an honorarium of \$1,000.

Redwood for Interiors.

Waiving the beauty of its rich, warm color, and magnificent grain for finishing without paint—which, after all, is only a matter of individual taste—there are other

substantial reasons for its preference over any other timber used in building

If the writer's memory serves him correctly, none of the lumber produced east of the Sierras, no matter how well prepared, is at all times free from shrinking and swelling, caused by atmospheric and other changes, both of humidity and temperature. Clear, dry redwood is nearly absolutely perfect, if the dense black sort be thrown out. This, strange to write, has the odd quality of shrinking endwise, but it does not rot, in any situation, during the life of one generation. At Fort Ross, in Sonoma County, Cal., the redwood stockade yet standing, which was driven in 1812, is in good preservation. Driven picket fences—our common form of fences—when removed after twenty years actually show the minutest ax marks of sharpening only when occasional sap-py sticks were driven. For fence posts and foundations it vies with red cedar.

As a rule only the first log of each tree yields this heavy, durable timber. That above it, if fairly well seasoned, will stay in any place above the ground the house joiner chooses to put it, like a bar of iron. A coal stove can be placed near a light partition, and fired up all winter, without causing cracks to widen in the joints. The outside rustic does not flinch in the heat of summer nor draw apart from the paint. And, finally, this timber, though combustible, is, perhaps, ten times less liable to combustion than any sort of pine. —N. W. Lumberman.

Plans and Specifications.

Full plans and specifications complete, ready for the builder, may be obtained at this office, for any of the structures illustrated in this publication. We also prepare plans for buildings of every description, including dwellings, churches, schools, stores, barns, carriage houses, etc. Our work extends to all parts of the country. We are assisted by able architects. Terms moderate. MUNN & Co., 361 Broadway, New York.









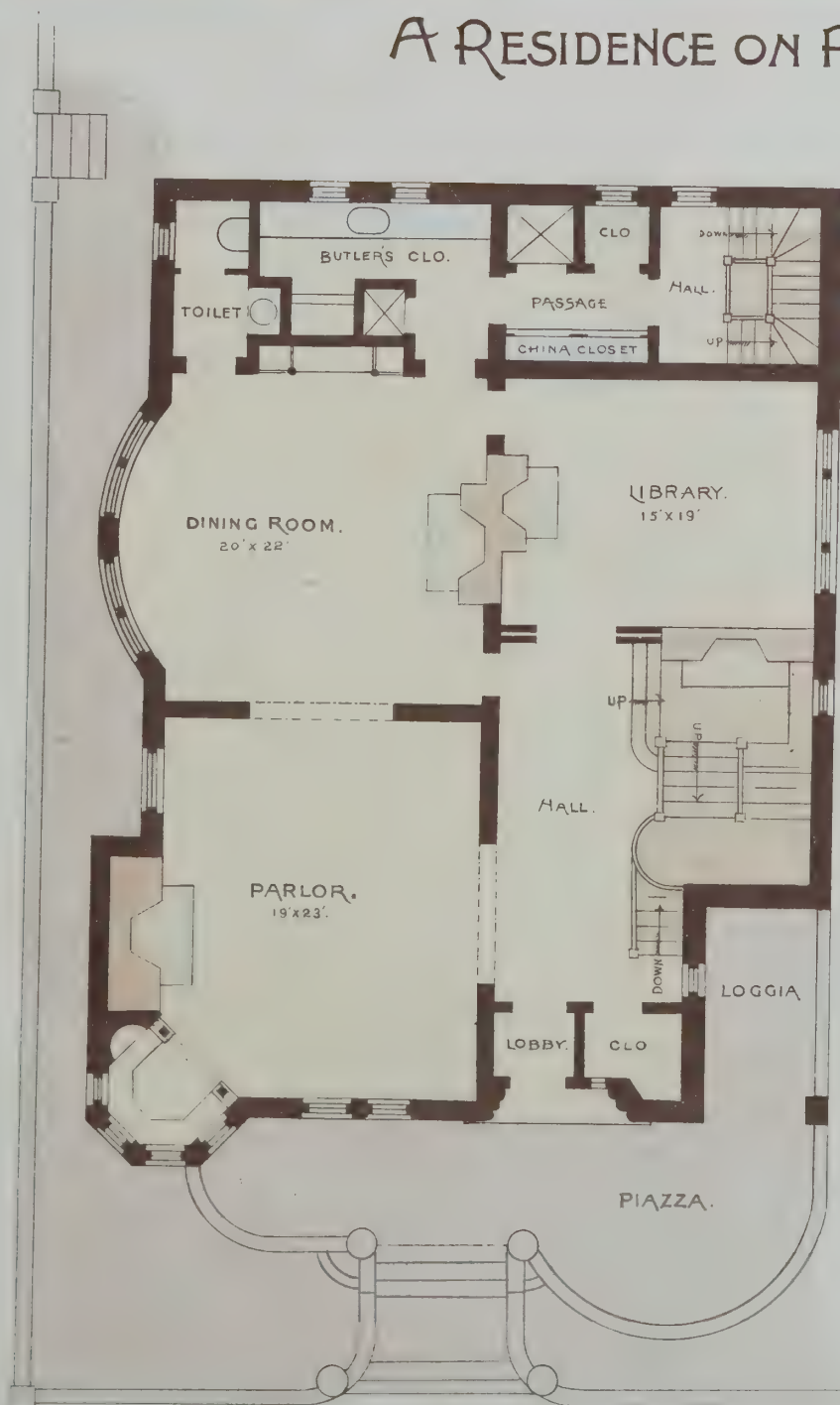
BRICK DWELLINGS OF MODERATE COST.







A RESIDENCE ON RIVERSIDE PARK, N.Y.



FIRST FLOOR PLAN.



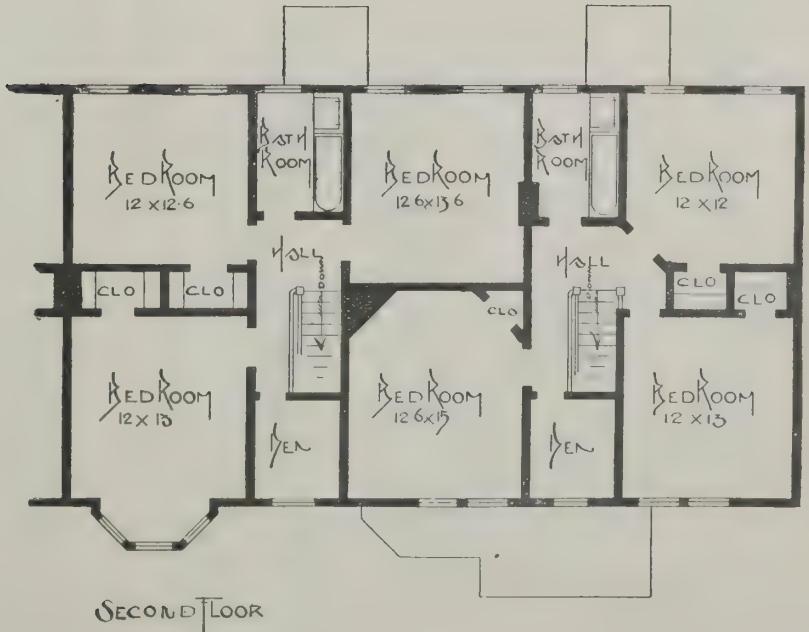
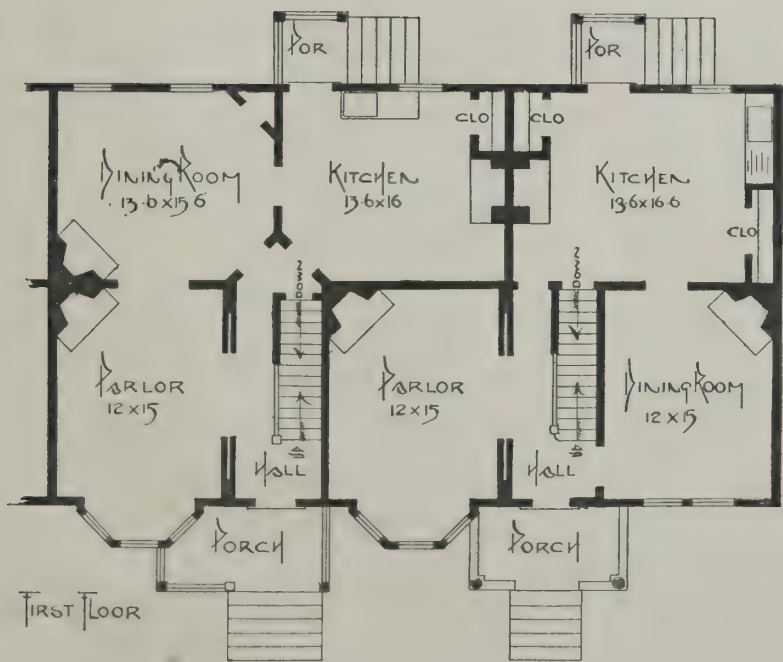
SECOND FLOOR PLAN.









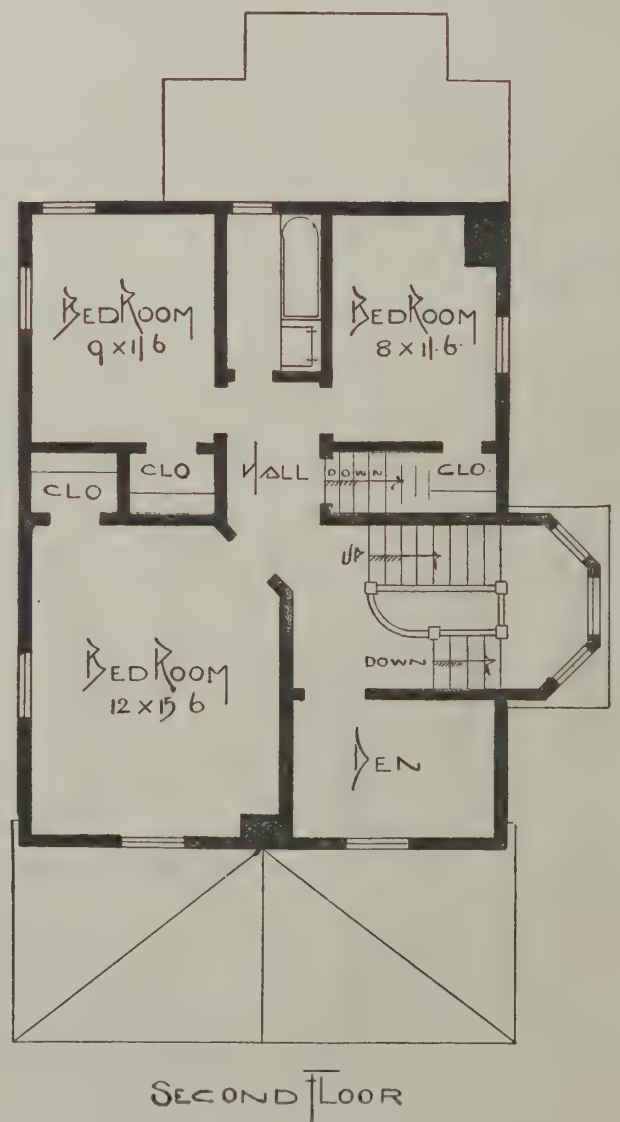


[See page 81.]

HOUSES OF LOW COST.







[See page 81.]

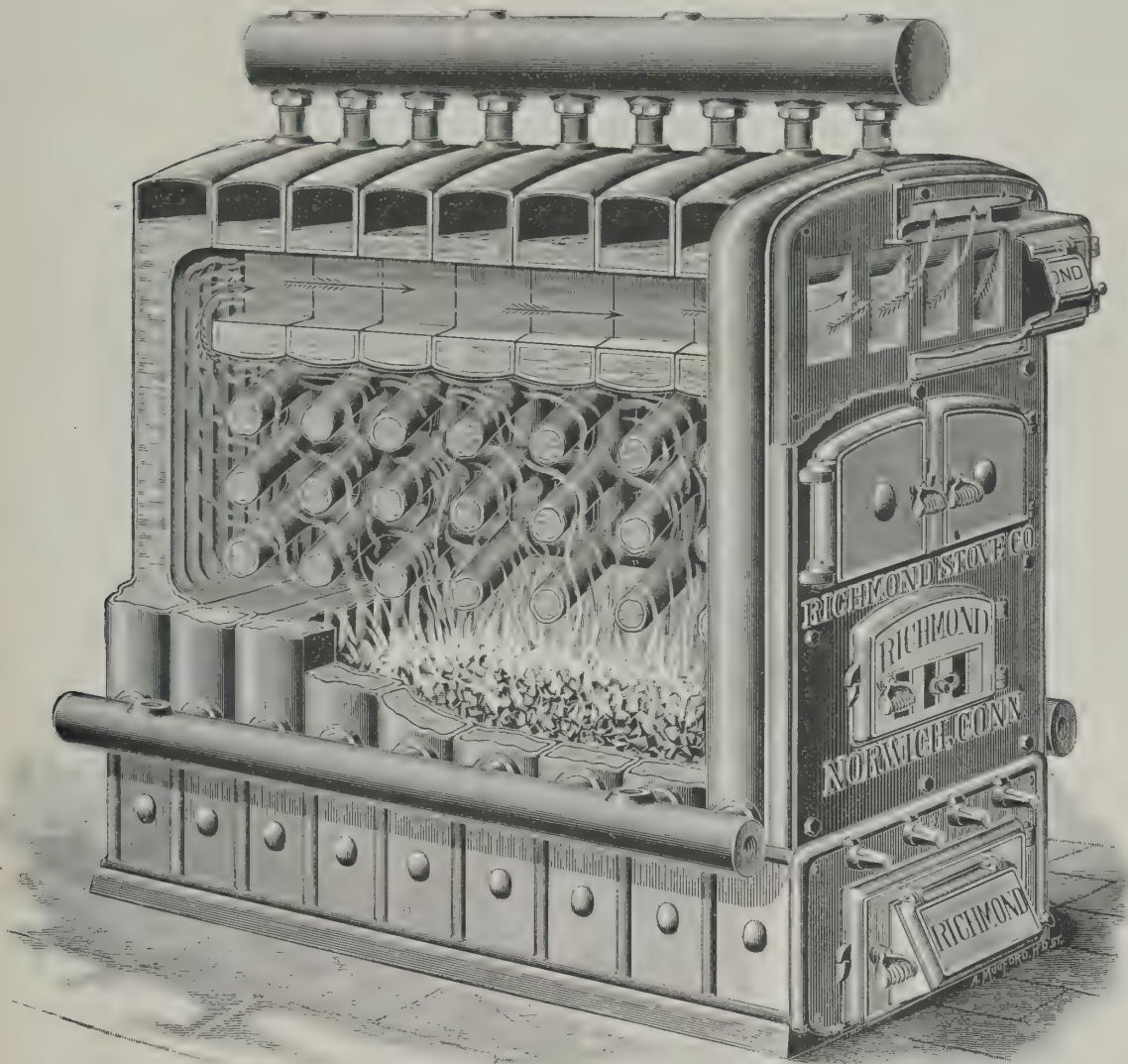
A COTTAGE AT ELM STATION.



THE RICHMOND HEATER.

The heater shown in the illustration is designed, from the arrangement and quality of its fire and flue surfaces, and the principles of circulation adopted, with the areas of waterways and flues, to afford the highest results in economy and efficiency. Nothing has been sacrificed to cheapness in the construction, and great

casting, forming the back wall of the heater, having a corrugated surface exposed to the products of combustion on their passage to the flues. The ash pit base is made sectional, which admits of its being easily handled and shipped. The Richmond duplex grate is used, each section of which can be taken out easily, or replaced when desired, without disturbing the heater.



THE "RICHMOND" SECTIONAL STEAM AND HOT WATER HEATER.

care is exercised in its manufacture, from the moulding to the mounting room.

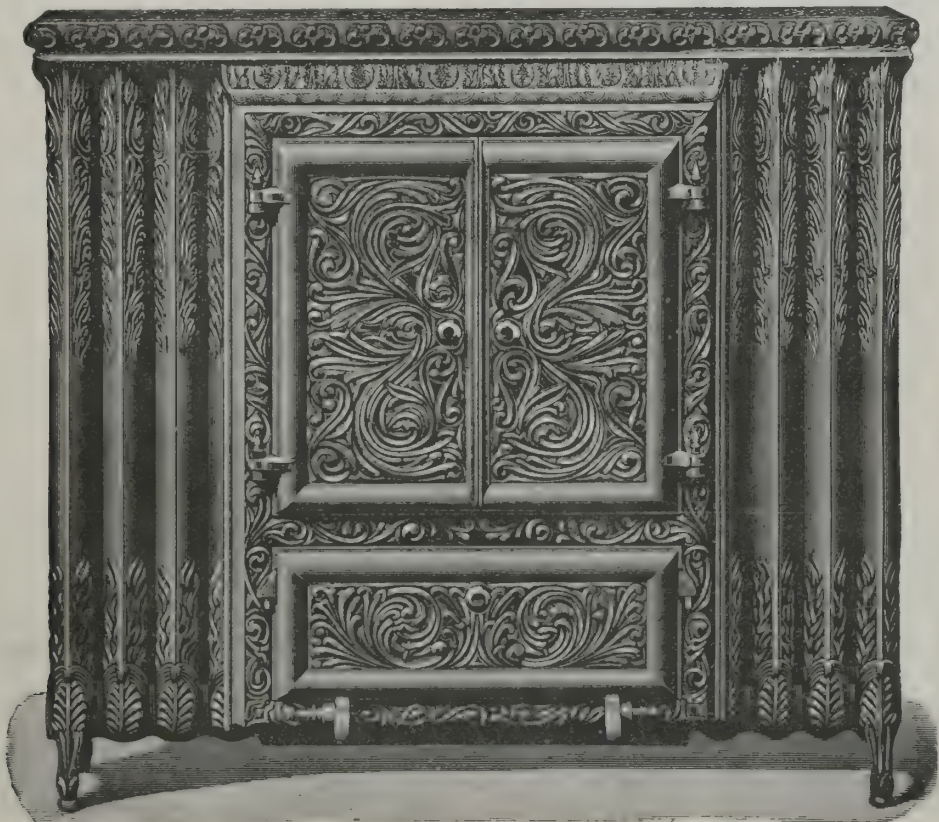
The sections are connected together by nipples to a single manifold on top, and to manifolds on both sides at the bottom, which are provided with tappings for small mains, besides flange unions for larger mains, sufficient for all requirements. The heater is made from seven up to twelve sections, covering a range of six sizes, and consists of the front section, leg section, intermediate and back sections. The front section is a hollow casting and has flue openings, clean out ports and fire door opening. The leg sections form the inside walls of the fire chamber, extend down from the crown sheet, and have three inclined arms on each side of smaller area extending or branching into the side walls of the section. The intermediate sections are similar to the leg sections, and the back section is a hollow

This heater is equally adapted for steam or hot water, the heater for steam being rated to supply from 1,000 to 2,700 square feet of surface direct radiation and from 750 to 2,000 square feet of surface indirect radiation. The heater for hot water is rated to supply from 1,500 to 4,000 square feet of surface direct radiation and from 1,100 to 2,700 square feet of surface indirect radiation.

This heater is manufactured by the Richmond Stove Co., Norwich, Conn.

SOME NEW DESIGNS IN RADIATORS.

The accompanying illustrations represent some attractive styles of radiator construction designed to meet the wants of those whose taste is most exacting. The pattern for the dining room is designed to look well in a handsome apartment, for which it is calcu-



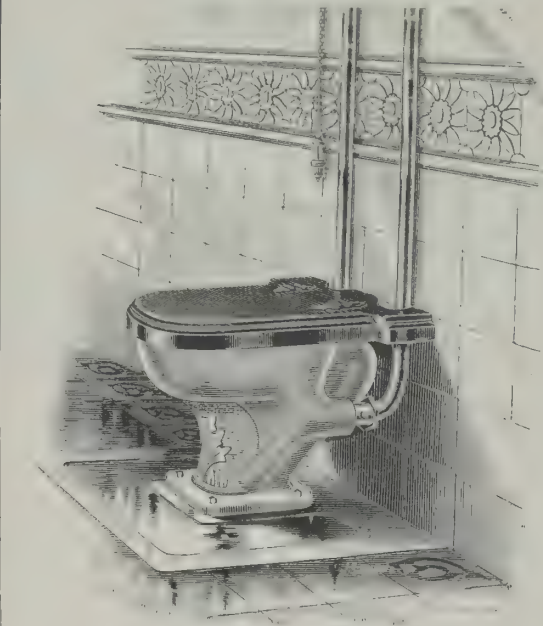
RADIATOR FOR DINING ROOM OR BUTLER'S PANTRY,

lated to serve as an efficient heater. It has swing doors at the sides and a drop door at the bottom, by opening which the radiator may be made to serve as a plate warmer. In the style shown for use in bay windows, the curve may be made of any desired pitch, the manufacturers also making a column radiator of any required radius, and of heights varying from twenty to forty-five inches.

These radiators are manufactured by the Michigan Radiator and Iron Manufacturing Company, of Detroit, Mich., a company whose goods took the first prize at the Paris Exposition for neatness of design and excellence of construction. The company has a very large productive capacity, its plant covering an area of about six acres, and it has had an extended export trade

IMPROVED PLUMBING APPLIANCES.

In the closet shown in the accompanying illustration the trap is exposed, and cannot become clogged or lose

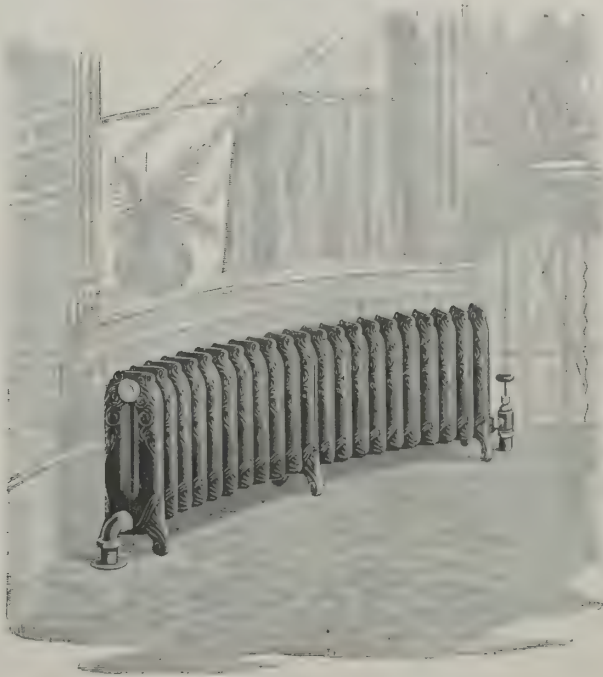


SANITAS CLOSET.

its water seal, while it is very simple in form. The design is attractive, rendering unnecessary any wood-work except the seat and cover, while its form is a protection against freezing. This closet constitutes one of a line of "Sanitas specialties," which include also basins, bath tubs, sinks, faucets, and other plumbing requisites, made by the Smith & Anthony Stove Co., 48 Union Street, Boston. This name has been given to the goods because they are designed to embody science, simplicity, and safety, combined with the best material and workmanship, being in accord with the most advanced professional opinions.

BENT GLASS, for windows or other purposes, is by no means difficult to obtain, nor does it involve much additional cost over the price of flat glass, as some builders and workmen occasionally represent to their customers. Those who desire to employ such glass, therefore, for particular locations, should insist on having their designs carried out. Messrs. Vanhorne, Griffen & Co., of New York, who are large importers of glass, have bending works at Newark, N. J., and they write us that they can supply all orders for bent glass at a small additional expense, and without delay.

THE Samson Cordage Works, Boston, Mass., manufacturers of solid braided window sash cord, have recently removed from No. 164 High Street to 115 Congress Street, near Milk Street, where they have greatly increased business facilities.



RADIATOR FOR BAY WINDOWS,



## IMPROVED WOOD-WORKING MACHINERY.

The accompanying cut represents a new double rip and cross-cut saw, for edging, ripping, and cross-cutting; designed for general use, and especially for accurate work. It will also be found a useful machine for furniture and cabinet factories, sash, door and blind, and carriage factories. Its construction is simple and can be changed to suit the work desired in a very few minutes. The column is one entire casting, with the saw mandrel arranged to revolve around a common center inside the column, so that when the ripping saw is above the table, the cut-off saw is below the table, and for grooving, either saw can be brought above the

sizes and modifications of construction, which they manufacture in such a large way as to secure the best of work at a comparatively low cost. The Hartman steel tree guard, likewise shown herewith, is ornamental, strong, durable and cheap. The spiral wire coils for attaching this guard to the tree are elastic and freely expand with the growth of the trunk, preventing friction or chafing of the tree against the guard during storms or high winds.

## THE "HEATENCOOK" RANGE.

The "Heatencook" range, which is the appropriate name of the appliance here illustrated, is designed to

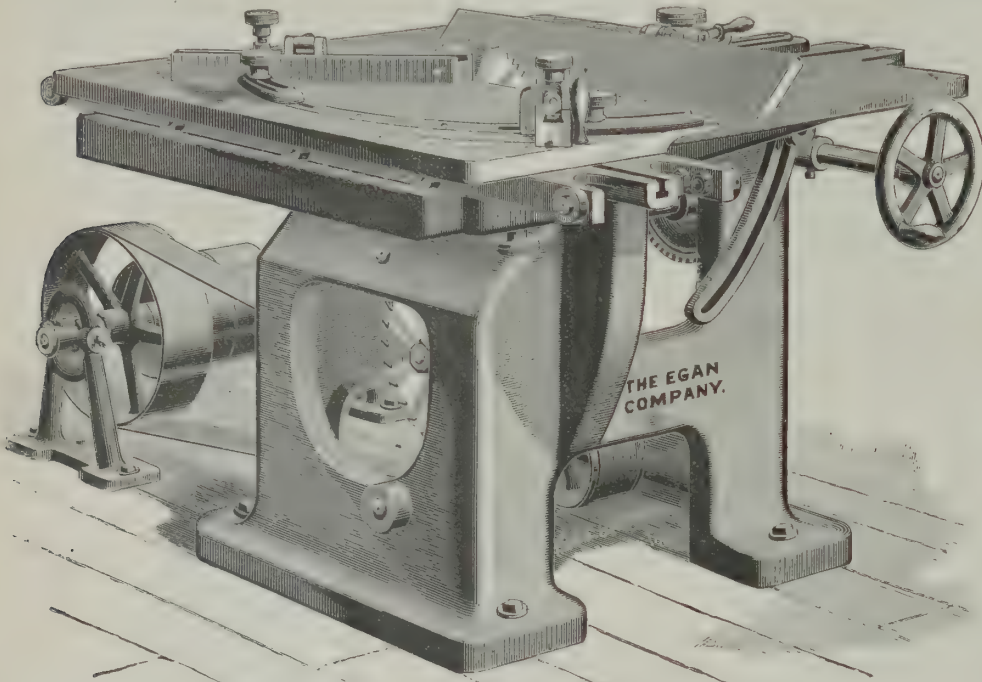
effect economy in labor and fuel as regards the heating of houses and cooking of food. It has long been very obvious that a large amount of heat from cooking stoves and ranges goes off unutilized. The Heatencook range is designed to be an efficient cooking stove, and also to utilize this waste heat.

Above its main cooking division a hot air chamber is arranged, through which the gases of combustion pass. In this chamber are placed a number of water pipes connected to a hot water heating system which is car-

ried through the dwelling. This hot air chamber with its water pipes represents the ordinary hot water furnace. The range is used for cooking as is any other range, but the hot gases from the fire, instead of going away uselessly, are made to heat the water and to cause the entire system to operate in warming the house. The products of combustion ordinarily leave a range at

ator, valves are open, a constant circulation is maintained through the pipes and radiators. A special radiator is supplied by the firm for use with this apparatus, and plans for the piping of houses are also provided by them. The operation is automatic. There is no high pressure possible, so that danger is entirely absent. The neatness of the heater is shown by the cuts.

The arrangement of the different parts and the construction of the heater are very complete. The "Heatencook" is arranged to supply hot water for domestic use, being connected directly to the street main or other supply, which always keeps the apparatus full of water.



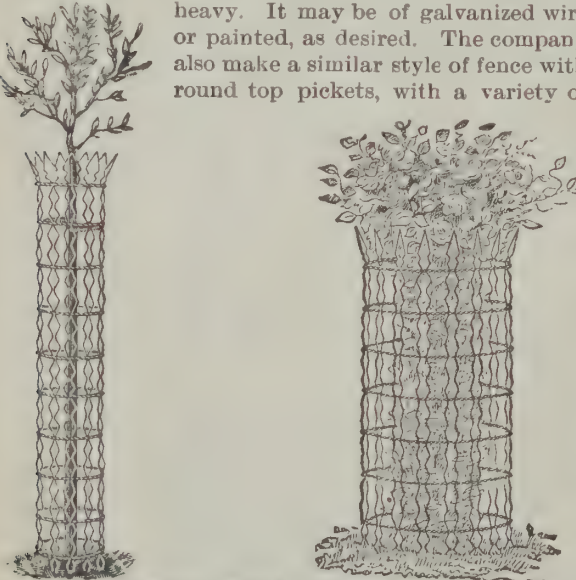
A DOUBLE RIP AND CROSS-CUT SAW, WITH TILTING TABLE.

table according to the depth of groove to be cut. The table is of iron, made in two sections, both sections planed perfectly true, and the one at the left of the saw made to work back and forth on rollers, for edging or cross-cutting. There are two miter fences for cutting right and left, and one ripping fence, all accurately fitted to the table and in line with the saw.

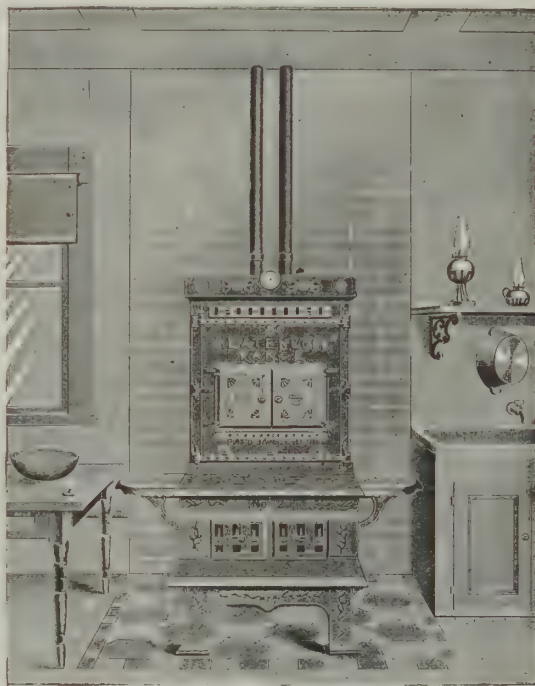
The mandrels are of steel, running in self-oiling boxes lined with babbitt, and driven from a countershaft placed clear of the column. For further information in regard to this machine address the originators and builders, the Egan Company, Nos. 209 to 229 West Front Street, Cincinnati, Ohio, U. S. A.

## A STRONG AND LIGHT LAWN FENCE.

The illustration represents what is styled a spear top lawn fence, made by the Hartman Mfg. Co., of Beaver Falls, Pa., with steel posts and top rail, and pickets of No. 6 wire, or of No. 4 wire if required to be extra heavy. It may be of galvanized wire or painted, as desired. The company also make a similar style of fence with round top pickets, with a variety of



STEEL TREE GUARDS.

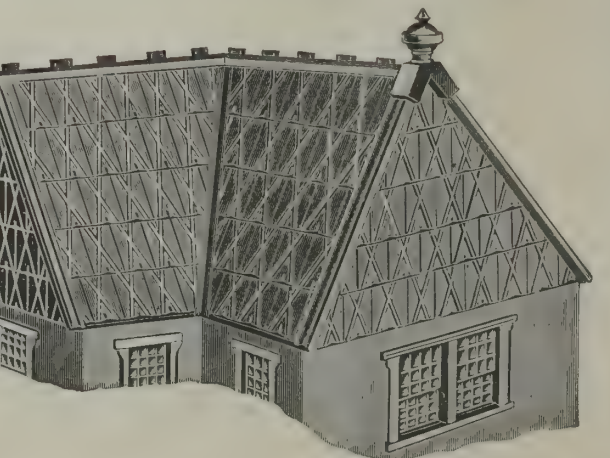


THE "HEATENCOOK" RANGE.

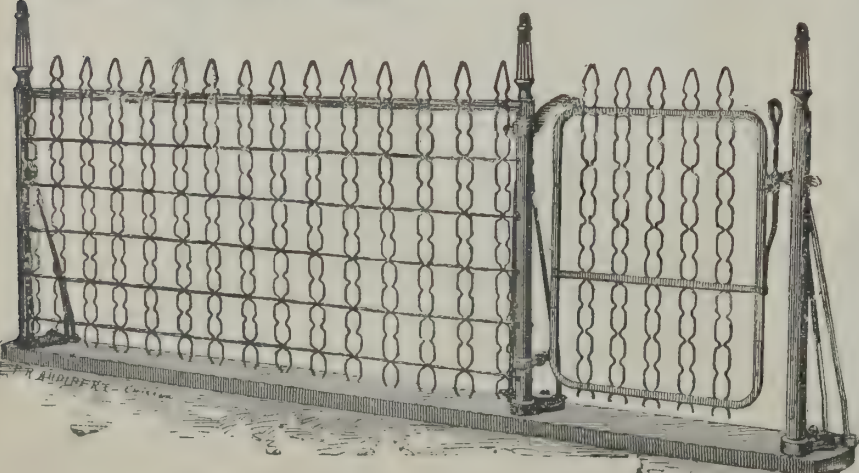
a temperature of 500 to 1,200 deg. F. In the heater we are describing, this heat is in part utilized. The temperature of the products leaving the heating chamber may be as low as 225 degrees, and will not ordinarily exceed the boiling point of water.

The illustrations show how well the arrangement is carried out. The range has its large cooking surface and plate warmers. An elevated oven is included in the hot air chamber. Back of the oven are the heating pipes.

From the top of the water heater one or more pipes are taken through the house and connected to the radiators, which are placed in such rooms as it is desired to heat. Return pipes are run from the radiators and connected to the bottom of the heater. When the radi-



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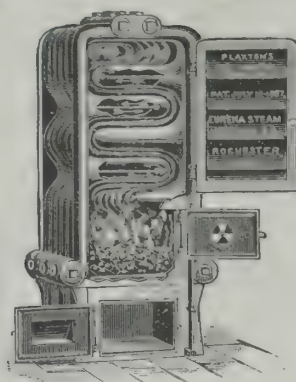
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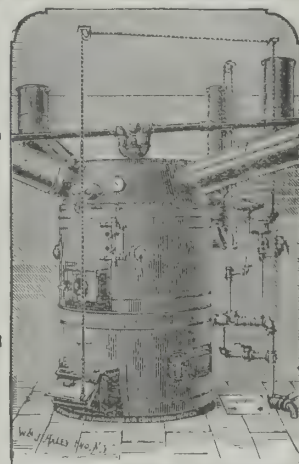
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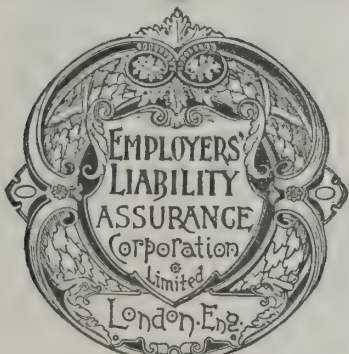
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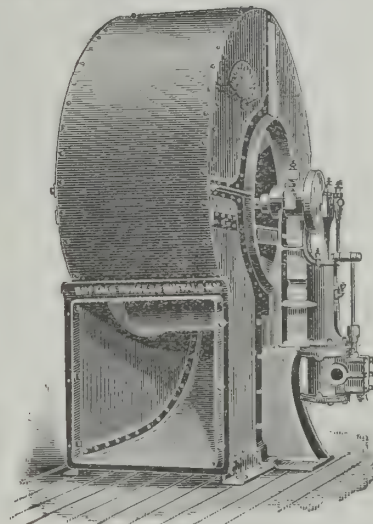
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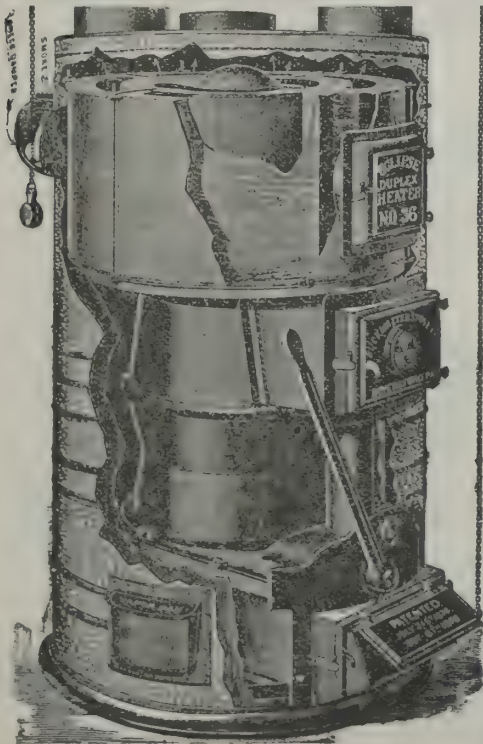
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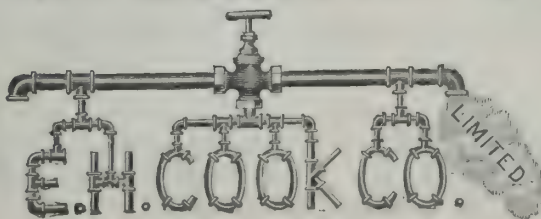
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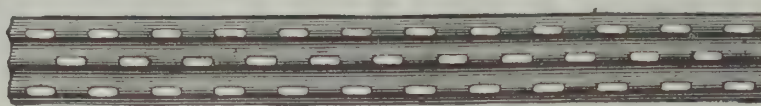
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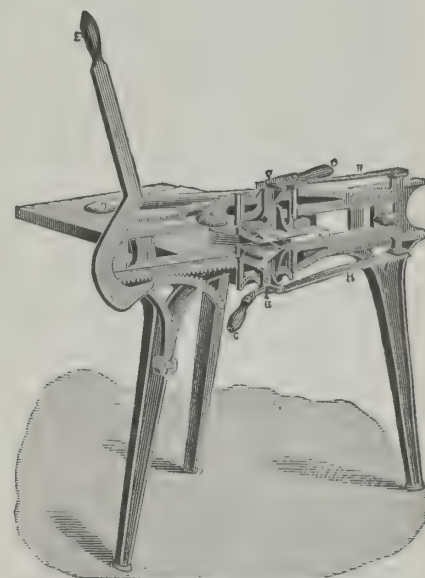
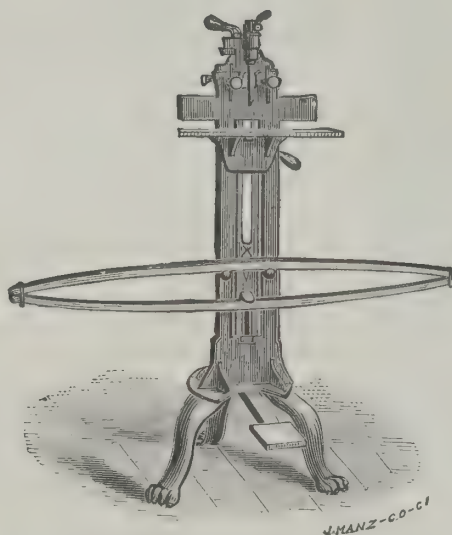
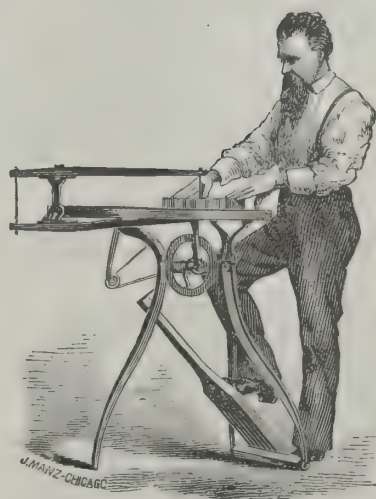
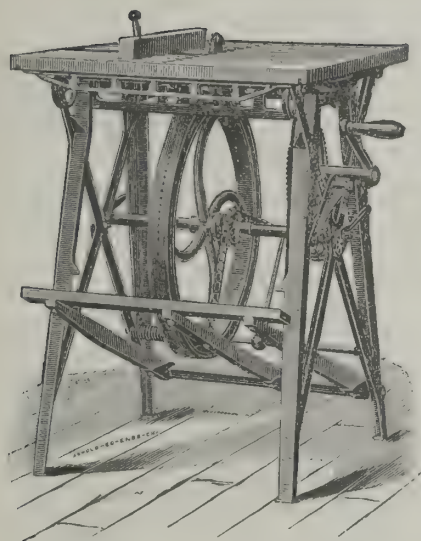
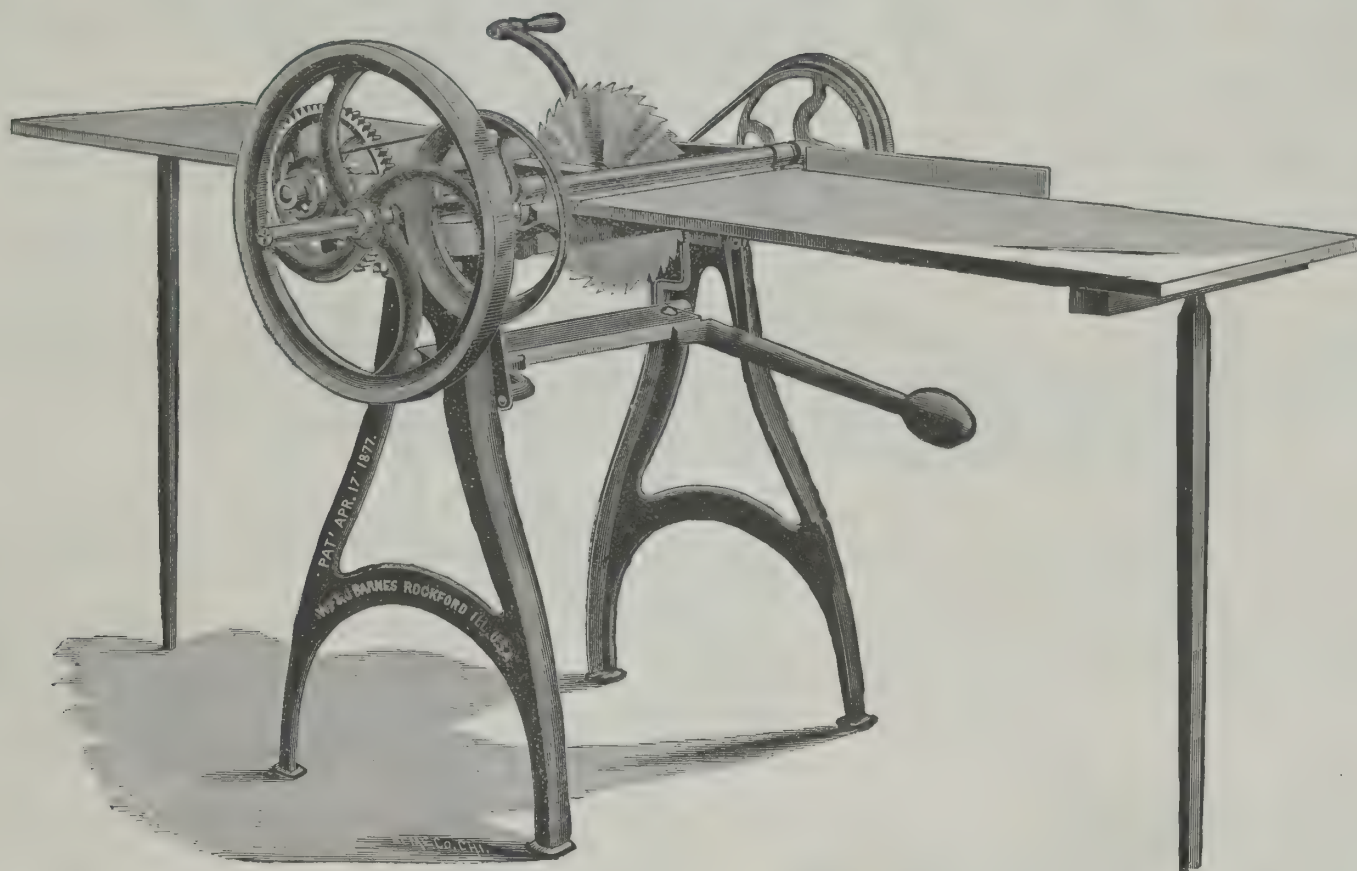
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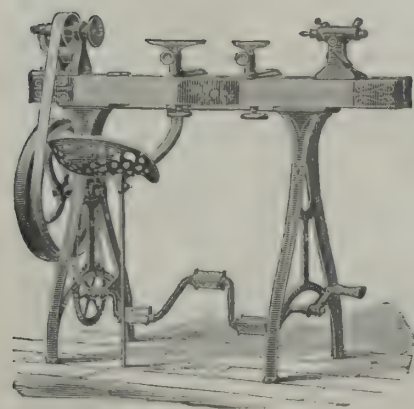
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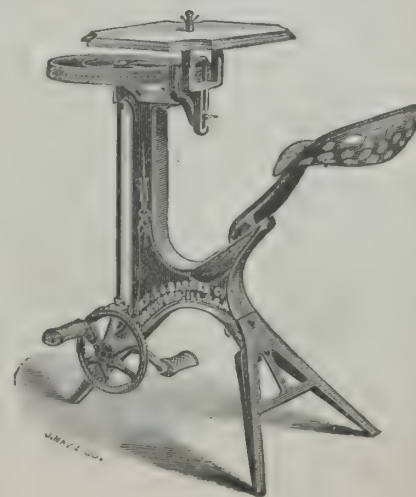
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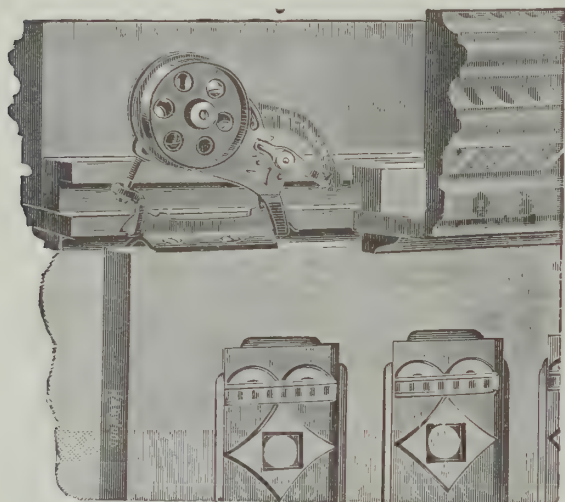
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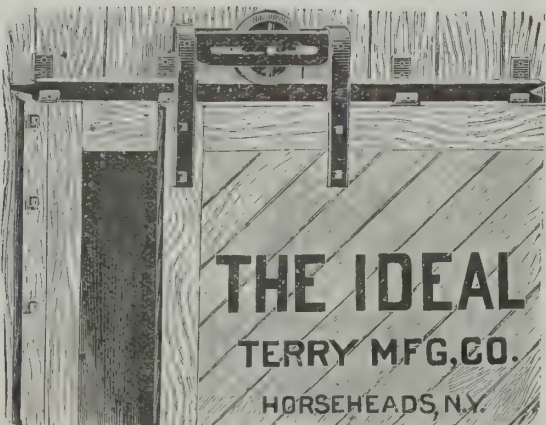
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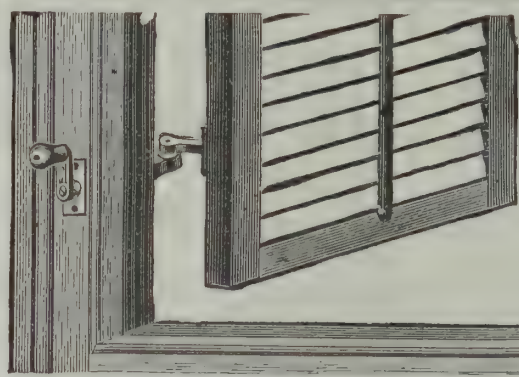
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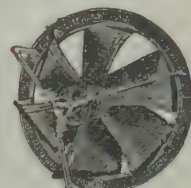


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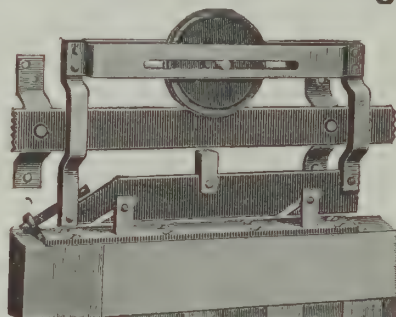
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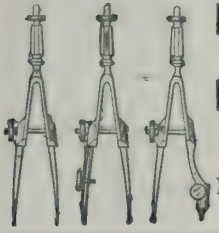
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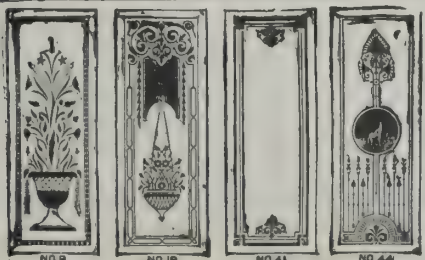
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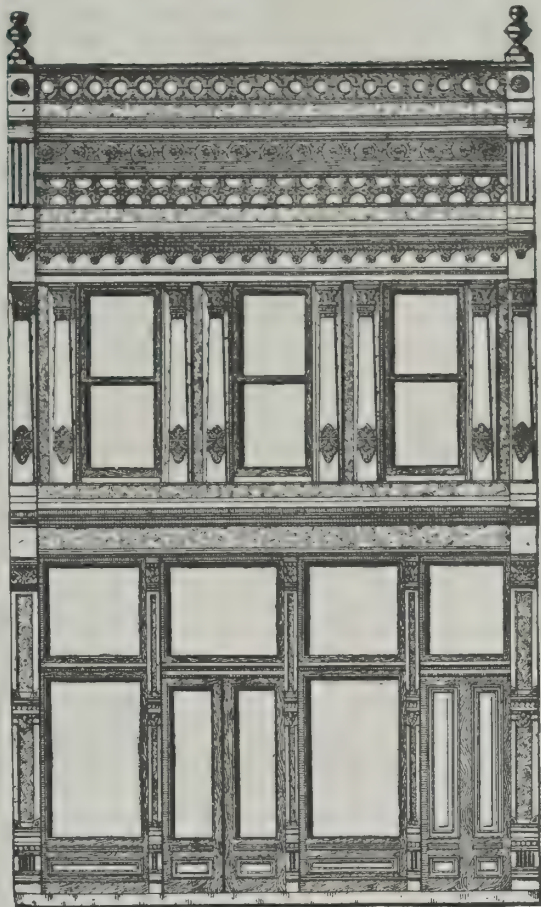
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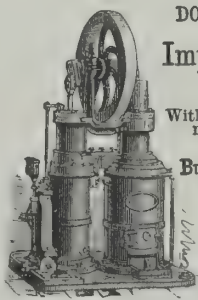
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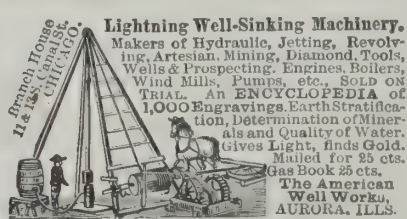
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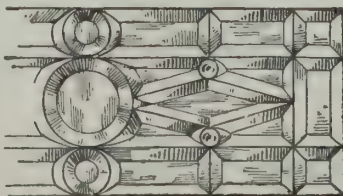
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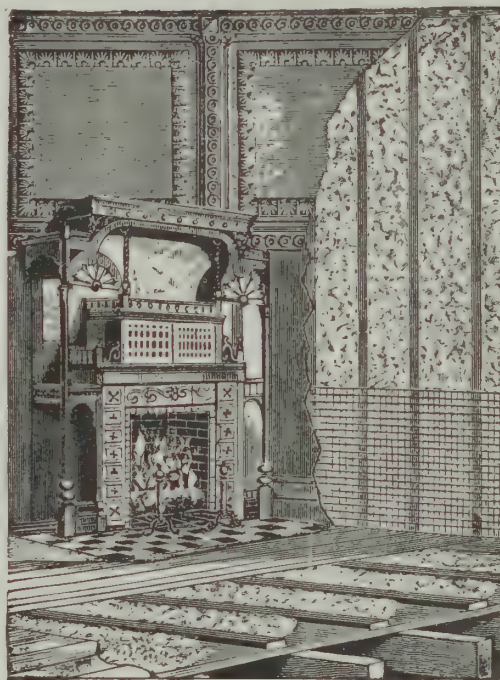
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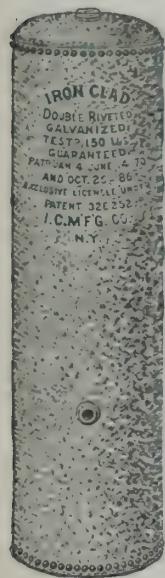
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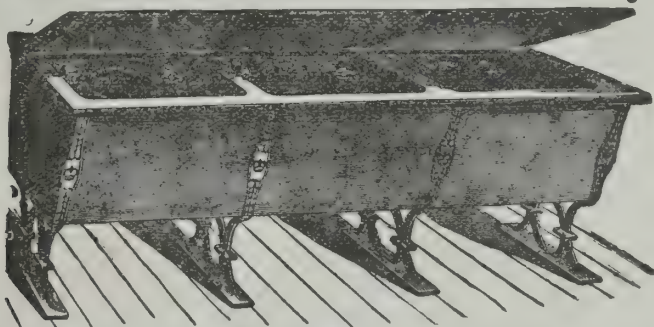
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## WOODEN TANKS FOR HOUSE WATER-SERVICE

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### Notes and Queries.

(1) F. F. M. submits the following prob-  
lem: Purchased a lot for \$2,500, held it six months and  
sold it for \$6,300, allowing 8 per cent interest on the in-  
vestment and \$315 commission. What was my gain  
per cent? A.  $\$2500 \times 0.4 = \$100$  interest.  $\$6300 - \$2500 =$   
 $\$3800$  gross gain.  $\$3800 - (100 + 315) = \$3385$  net gain.  
 $\$3385 \div 2500 = 135.25$  per cent.

(2) M. D. asks: What is the effect  
on torsional strength of boring out a steel or iron shaft,  
i. e., will a shaft of given diameter bear greater tor-  
sional strain after being bored out? A. It will not.  
The idea is derived from the general statement in tech-  
nical works that tubular shafts are stronger than solid  
shafts for equal weight.

(3) W. H. B. asks: Which profession,  
civil engineering or mechanical engineering, offers the  
better opportunity to a young man at present? A. So  
much depends on opportunities that a general answer  
is difficult. The profession of mechanical engineer is  
more apt to lead to permanent positions, and is a step-  
ping stone to electrical engineering. In civil engineer-  
ing the first steps are more difficult, and many positions,  
such as on railroad work, are only temporary. The  
different branches cannot well be enumerated. They  
include draughting room work, supervision of machine  
shops, surveying, bridge building, etc.

(4) V. G. Van S. asks how mercurial  
thermometers are made to ring an alarm for heat and  
cold. To tell when the heat has reached a certain  
point and when it sinks a few degrees below. As glass is  
really a non-conductor I do not see how a contact point is  
made with the mercury enclosed in a tight tube of glass,  
especially when you want the alarm at different de-  
grees of heat. A. Platinum wires are soldered into the  
glass, penetrating the walls of the tube and coming  
into contact with the mercury as it rises or falls. On  
this principle electric connections may be made or  
broken as desired.

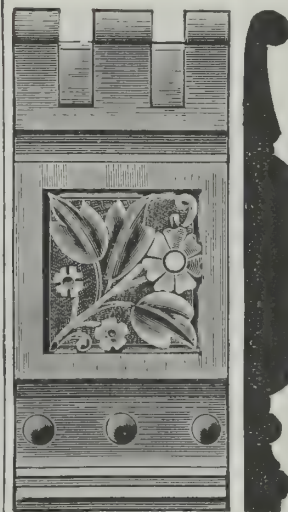
(5) A. K., Jr., asks: 1. What is the best  
non-conductor of heat known to science? A. Vacuum.  
2. What is the best fireproof non-conductor of heat  
known to science? A. Zirconia. 3. Should the ob-  
ject that is to be protected have a polished surface to  
give the best results? A. Yes. 4. Does it make any  
difference of what color the protected object is? A.  
White is the best color. 5. Is a vacuum as good a non-  
conductor of heat as the same space would be filled  
up with air? A. Yes; better. 6. Does heat radiate  
through solid non-conductors of heat as well as through  
air? A. No.

(6) Photog. asks: Can you inform me  
through your paper how to prevent show windows (in  
stores) from frosting during cold weather? A. Venti-  
late from top of window casing by several three or  
four inch openings, with hoods to exclude rain.

(7) Plumber asks: Will you be kind  
enough to send me a sample copy of the "Plumber's  
Problems"? A. We can supply you with the book  
called "Plumbing Problems," price \$2.

(Continued on page ix.)

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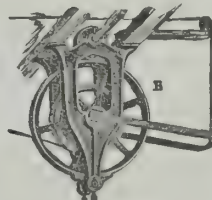
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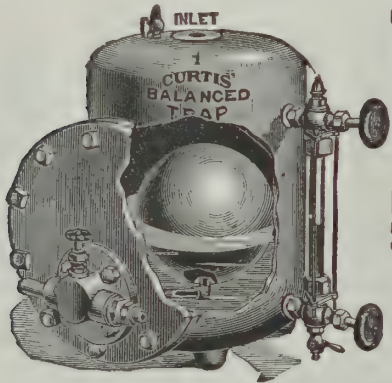
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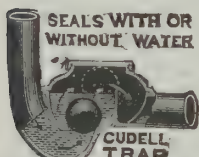
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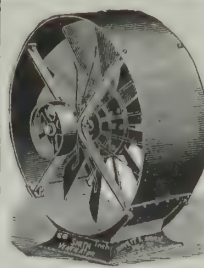
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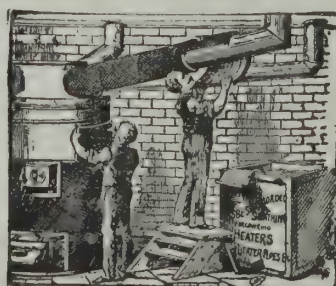


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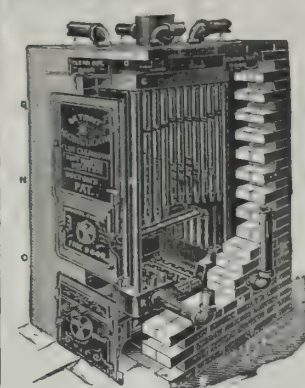


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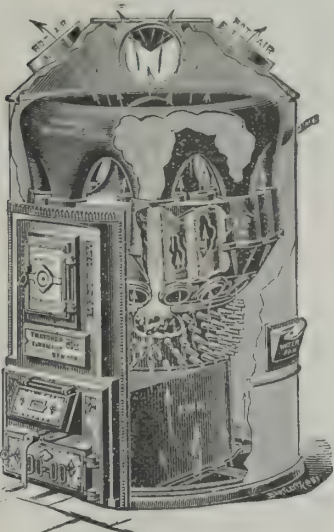
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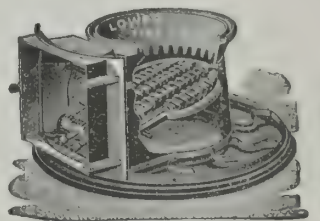
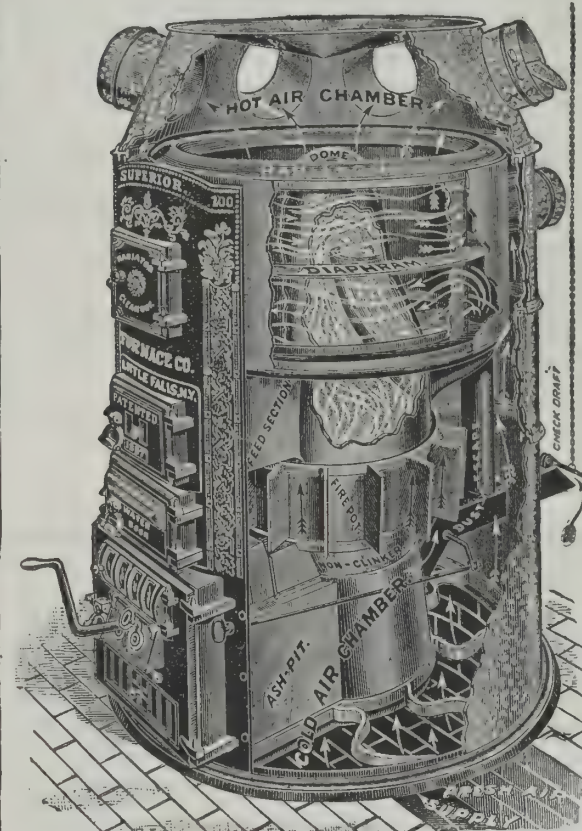
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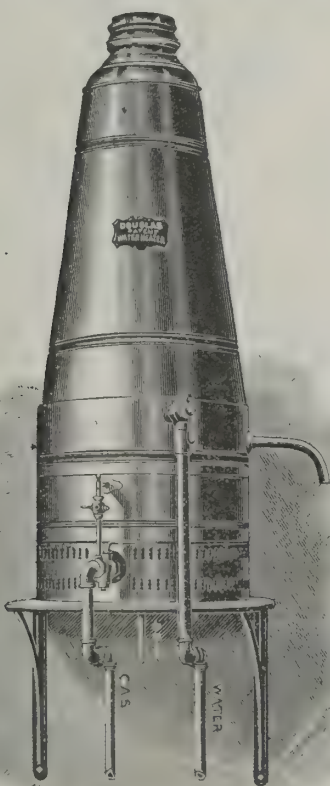
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(Continued from page vii.)

(8) H. S. M. says: I am building a cistern for rain water. Depth about 10 feet, capacity 100 barrels. Cannot keep spring water from working in at the bottom, though it has three separate bottoms, in all about 13 inches hard cement. Please tell me what best course to pursue. A. You should have used Portland cement. The leak will soon stop when the cistern is in use. Fill with water to balance leakage. 2. Does the top part of a wagon wheel move faster than the bottom while in motion? If so, why? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 706, for this and kindred subjects.

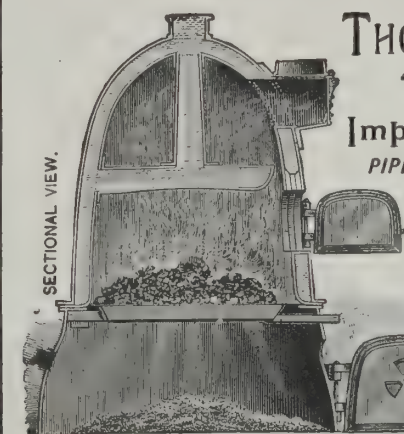
(9) J. B. asks: 1. Having trouble with moths eating plush silk furniture, can you furnish me a preventive? Also what will I procure to destroy the present annoyance? A. Thorough cleaning, beating, and brushing is the best cure. Treatment by a naphtha laundry is efficacious. 2. What do paper hangers make paste of that has such a consistent body and adhesive qualities? A. Use rye flour paste. Mix the flour with a little water to a perfectly smooth mess, then add more water and cook. The paste may be passed through a fine screen if desired. If properly manipulated, this will not be necessary; some glue may also be added.

(10) J. A. A. asks (1) which way a valve should be set in piping any steam apparatus; that is, should the steam when the valve is shut strike the top or bottom of valve? A. Always connect valves so as to shut against the constant steam pressure. This will allow of repacking the spindle stuffing box at all times. 2. Which is the most economical, to run with full boiler, that is, water up to top gauge cock, or down to one and one-half or two gauges, as the case may be? A. The water line in boilers for economy, which means dry steam, should not be at the high water mark, but at a safe medium between the high water mark and the top of the tubes. As a general rule for horizontal tubular boilers of medium diameters, one and a half inches above the top of the upper tubes, to each foot of diameter, is a safe and economical height for the water line. This should correspond with the middle gauge cock when three are used, or to the second (from bottom) when four are used. There is much difference of opinion among constructing engineers as to the exact positions of gauge cocks and water gauge, so that it becomes a necessity for those in charge of boilers to know the relative position of water gauge and gauge cocks above the tubes.

(Continued on page x.)

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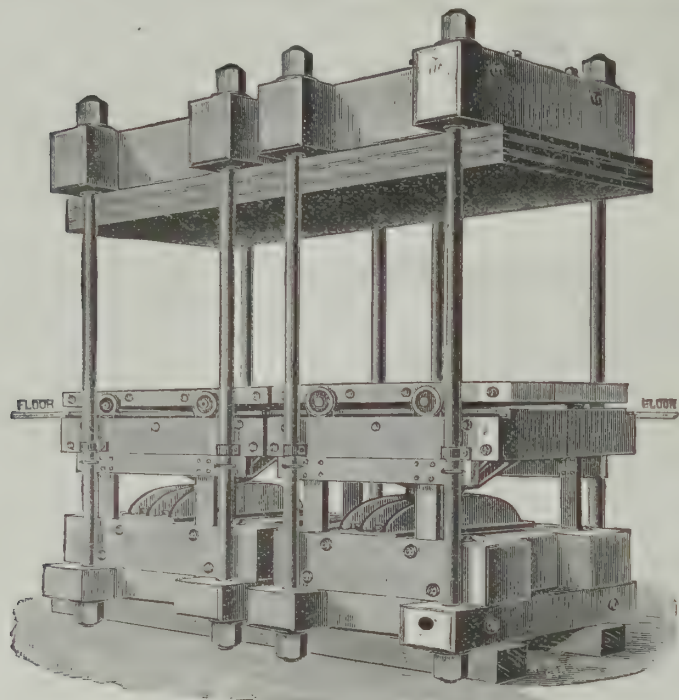
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(Continued from page ix.)

(11) P. G.—For metallic putty joints for flanges: To equal parts of white lead and dry oxide of iron (Prince's metallic paint) add their bulk of fine cast iron borings (sifted); mix and knead with the hands, adding boiled linseed oil sufficient to make the mass a stiff putty. Lay this under the flange about three-sixteenths inch thick, draw the flange down with the bolts, hammering the flange all around to bring it to a solid bearing. Rust joints are only made in socket joints, or in places where the borings can be driven with a calking tool.

(12) A. W. M. asks the best method of protecting a 1 inch steam pipe laid underground. A. A wooden box 4 inches in diameter inside for 1 inch pipe, coated with tar or asphalt, with notched cleats every 12 feet to retain the pipe in the center of the box. Fill in around the pipe loosely with mineral wool or pulverized charcoal, and cover without nailing, to facilitate repairs if ever found necessary. Lay tar paper over the joints of cover.

(13) C. G. B. writes: I have gained many valuable suggestions from your paper, and I thought you might be interested in the way you can make a nice-looking hall lamp out of a tin can, such as you will find in any grocery store; they are used to put up all kinds of spices in, and are made very nice, and just the right size, 12x7. Where the cover comes off, make a band of tin about 2 inches wide. Cut out nicks. Any tinsmith will make you a door in one side for 50 cents, and then cut out each side and put in glass plates such as are used for butter plates or sauce plates. I had a friend who painted mine in imitation of stained glass, and the effect is very beautiful when the light is placed inside. Then I took a round awl or any sharp-pointed instrument, and punched little holes all round in a fancy design, and hung glass pendants on the bottom, and then bronzed the can, and you would not know but what I paid \$12 for my lamp, and all this lamp cost was one dollar and fifty cents and a few hours' work evenings.

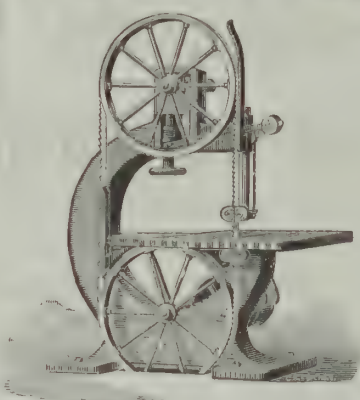
(Continued on page xiv.)

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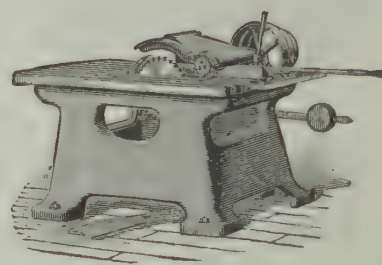
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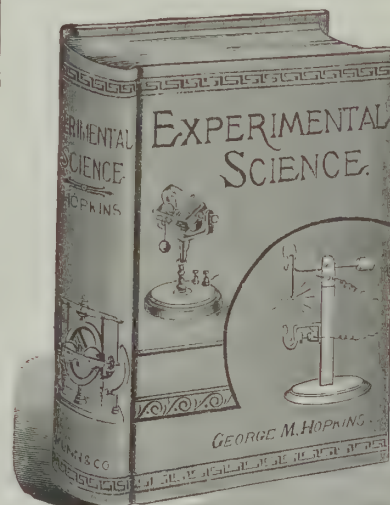
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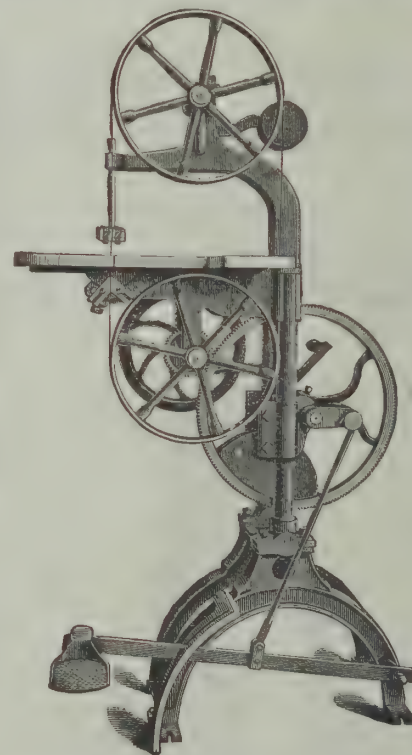


Table is 3 feet 6 inches from floor; measure 18 x 21 inches; is adjustable for cutting on a bevel. Guide for saw both above and below table. Distance from table to guide when raised its full height, 5 inches; 16 inches between saw and frame. All gears cut from solid iron. Shafts are made of steel. Saw pulleys covered with rubber. Upper saw pulley has adjustment to bring it into line with lower saw pulley. Weight of machine, 260 lbs. Machines on trial.

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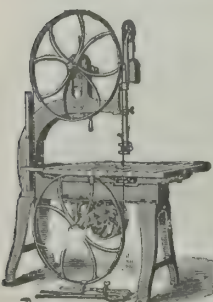
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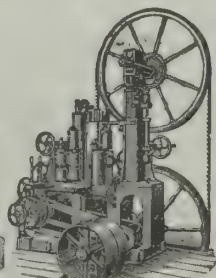
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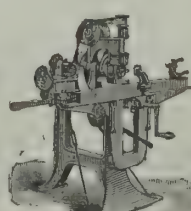
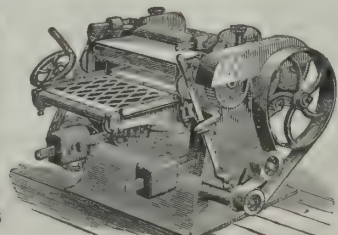
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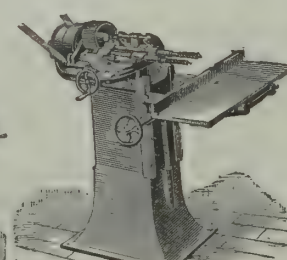
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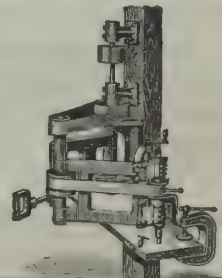
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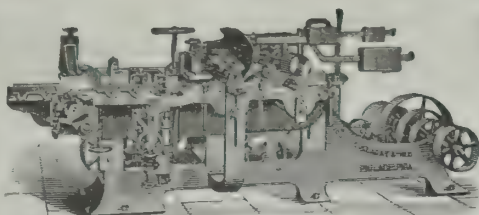




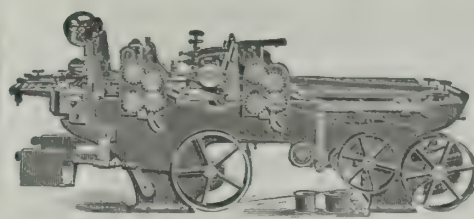
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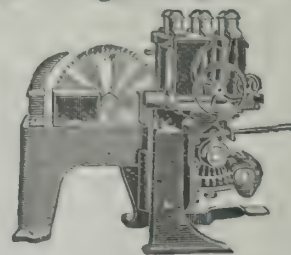
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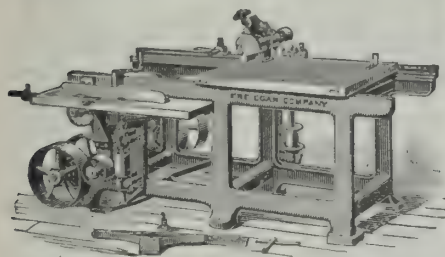


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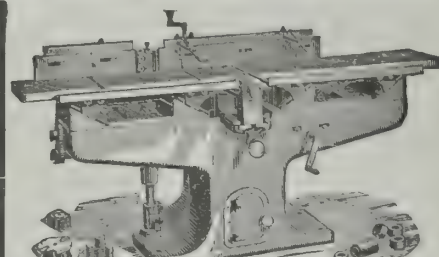
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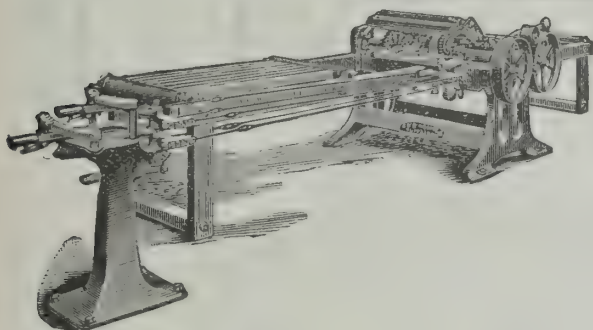
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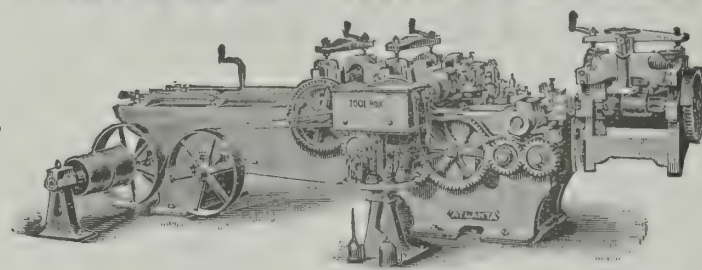
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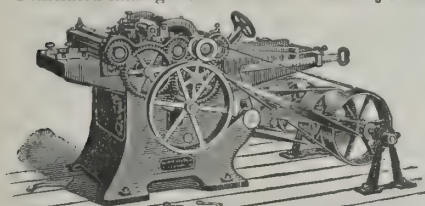


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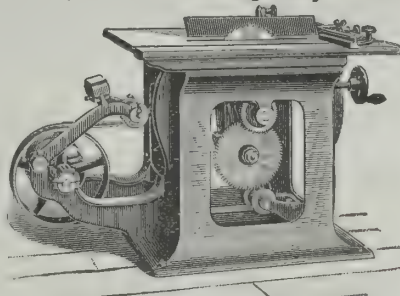
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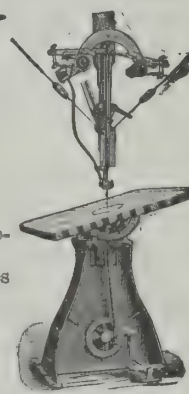
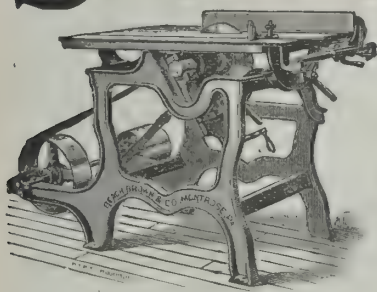
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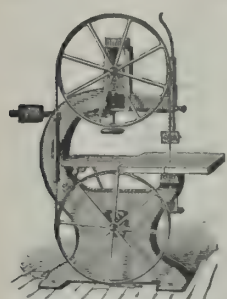
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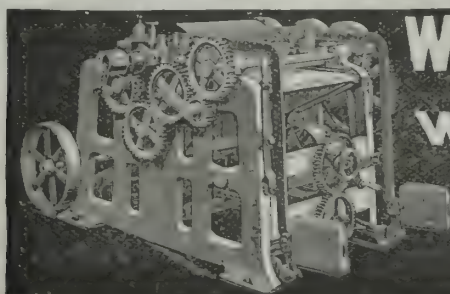
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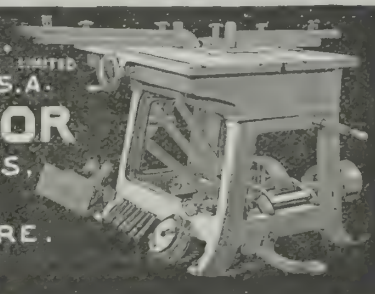
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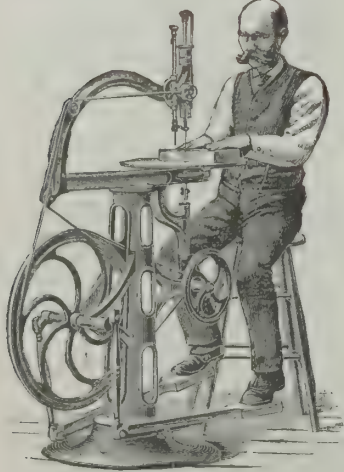
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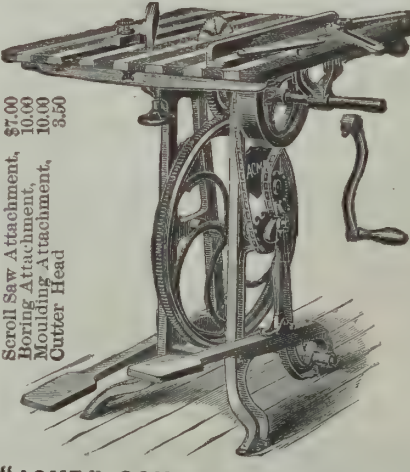
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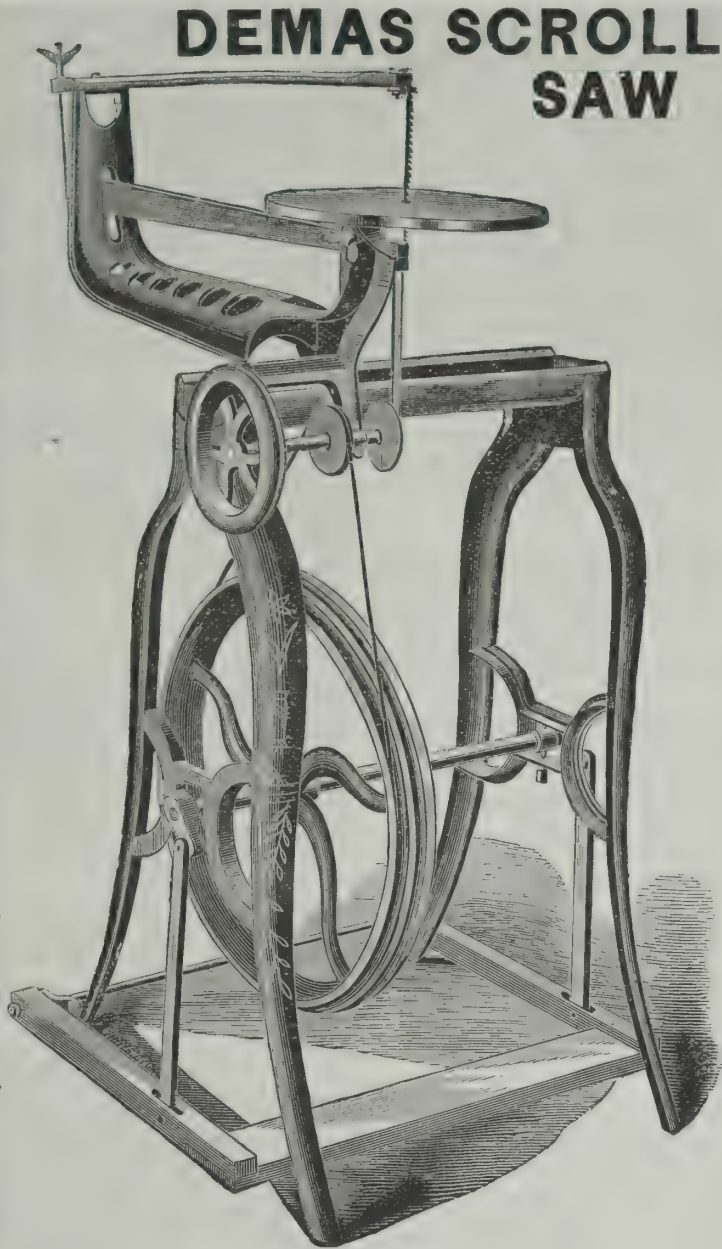
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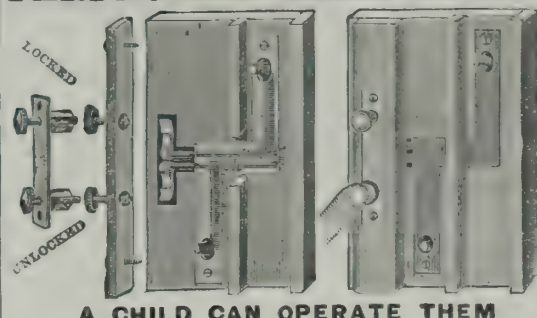
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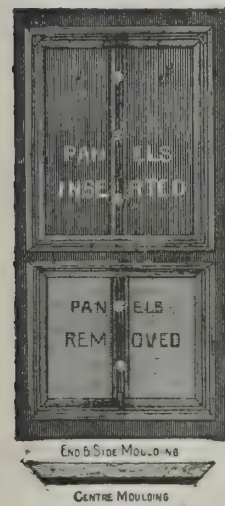
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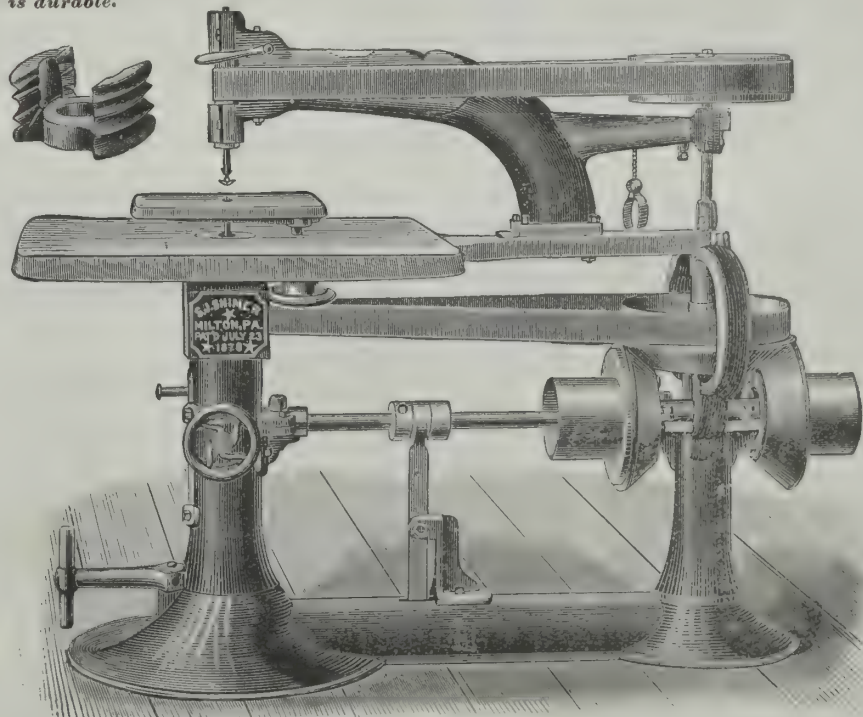
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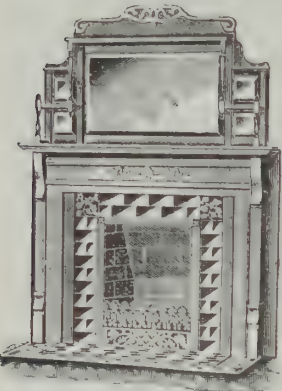
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(Continued from page x.)

(14) P. S. K. W. asks what to use to make a thin coating on wood so that hot oil will not penetrate it. A. Use an alcoholic solution of gum shellac.

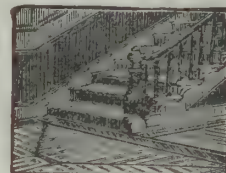
(15) A. R. asks how to obtain instruction book on mechanical drawing. A. Probably in no other work is there so much furnished for the price as in Professor MacCord's papers, published in the SUPPLEMENT. We have these papers, containing 450 special engravings, stitched in paper, for \$2.50, or bound in cloth for \$3.50.

(16) W. D. A.—Copper lined tanks are often known to give trouble by leaking after a few years, much of which arises from the manner of soldering. Most plumbers use common solder, made of lead and tin. For this kind of work pure tin should be used, and the laps thoroughly sweated through. The nails should be also of copper. We know of no way of repairing for such leaks but to take out the lining and retin all the laps.

(17) F. B. P.—For how to remove marble stains, see SUPPLEMENT, No. 129. For black enamel to apply on bicycles with a brush: Dissolve in about 2 pounds of tar oil, ½ pound of asphaltum and a like quantity of pounded resin; mix hot in an iron kettle, care being taken to prevent any contact with the flame. When cold, the varnish is ready for use.

(18) W. H. B. says: Will you please tell the cause of the following: In one corner of our cellar the concrete floor has been thrown up, just as though there had been an eruption under the floor. The floor is 4 inches thick, and we cannot find out why it has acted so. A. This may be caused by the upward pressure of water in the ground or by the lateral expansion of the concrete. Even if water is not shown, the air under the pavement may be subjected to a great pressure by the increased amount of water below it, the height of the latter being constantly changed by wet or dry states of the weather.

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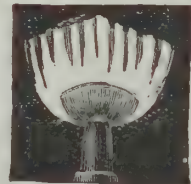
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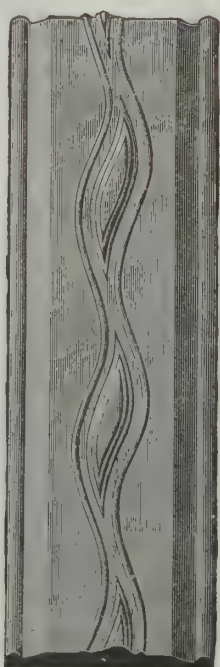
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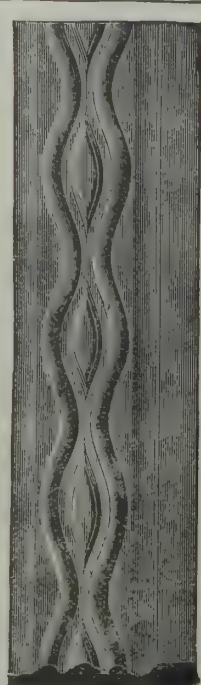
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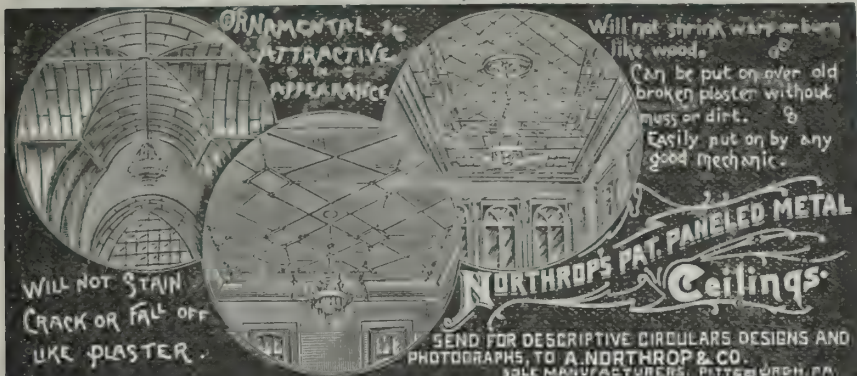
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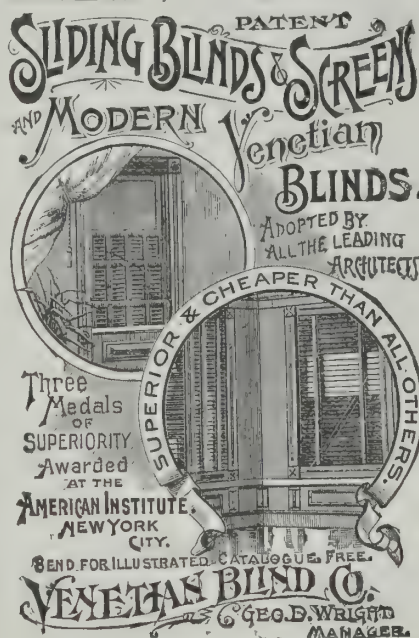
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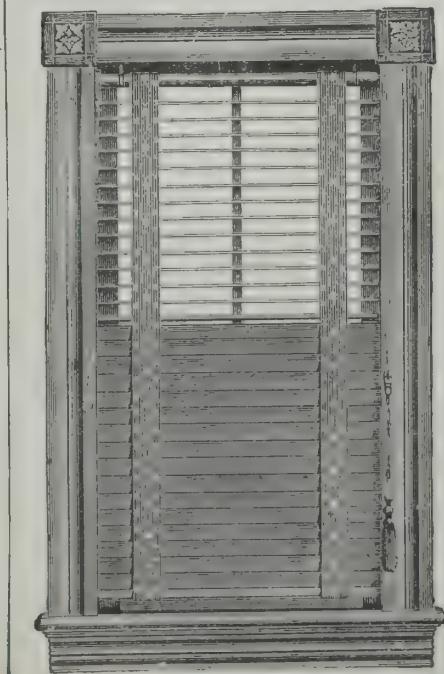
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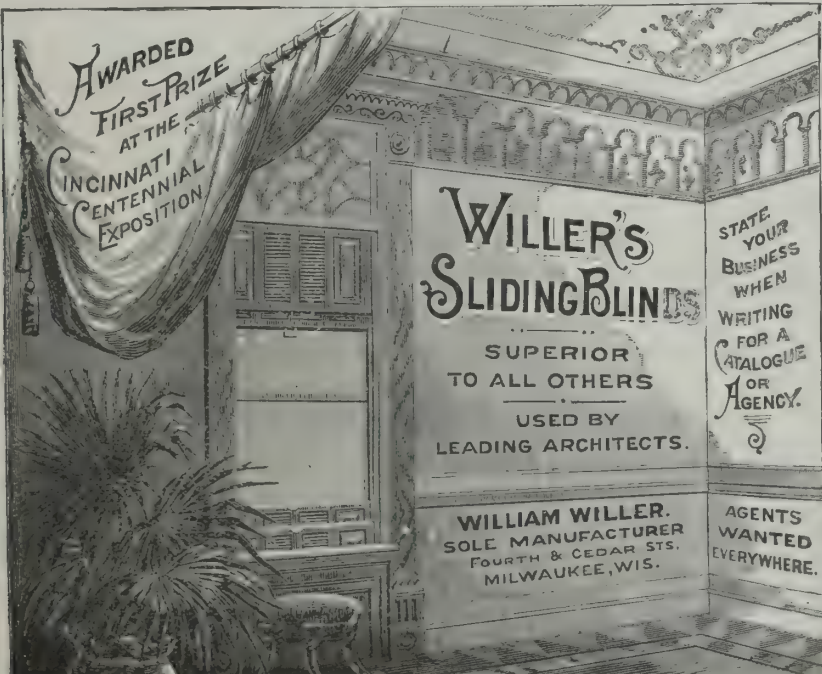
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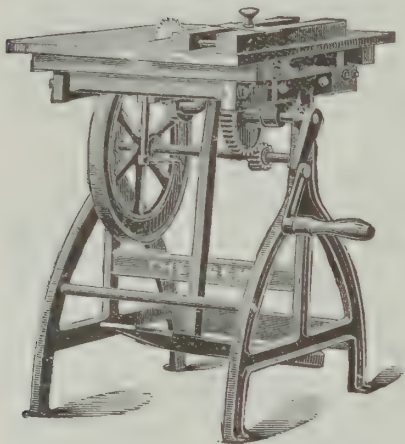
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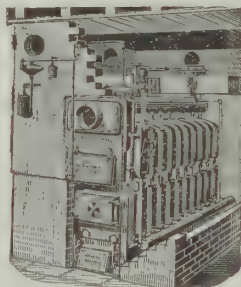
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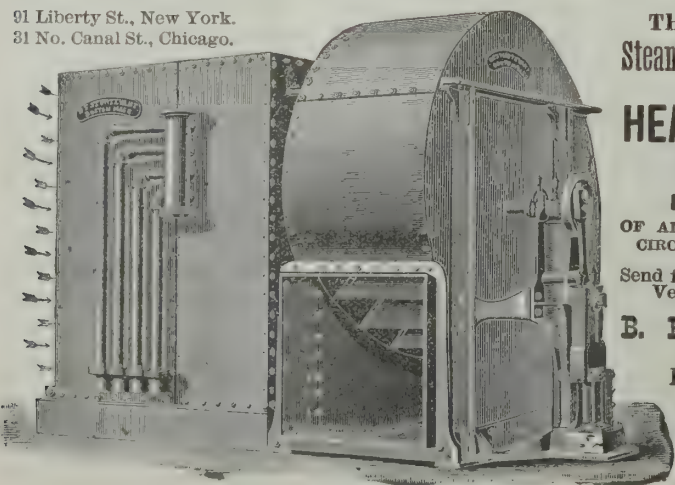
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"THE MANHATTAN DUMB WAITER."

"THE IMPROVED HUMPHREY HAND ELEVATOR."



Patented in the United States, Canada, and Great Britain.

We have many thousand Sets of our various machines in use throughout the United States and Canada, also in foreign countries, and it is claimed for them, by those who are using them, that they are the most complete Hand Hoisting Machines now on the market.

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We can also refer to fixtures running in nearly every large city in the United States, from Maine to California.

We have received several hundred voluntary testimonials of the merits of these machines, and we print below a sample one, from the factory of the well known inventor, Mr. Thomas A. Edison, at Harrison, N. J. We probably could not publish a testimonial from a better known concern in this country, and one whose opinion must be convincing to all.

THOMAS A. EDISON, President.

FRANCIS R. UPTON, Gen'l M'g'r and Treas.

EDISON LAMP CO.,

HARRISON, N. J., April 9th, 1890.

STORM MANUFACTURING CO.,

NEWARK, N. J.

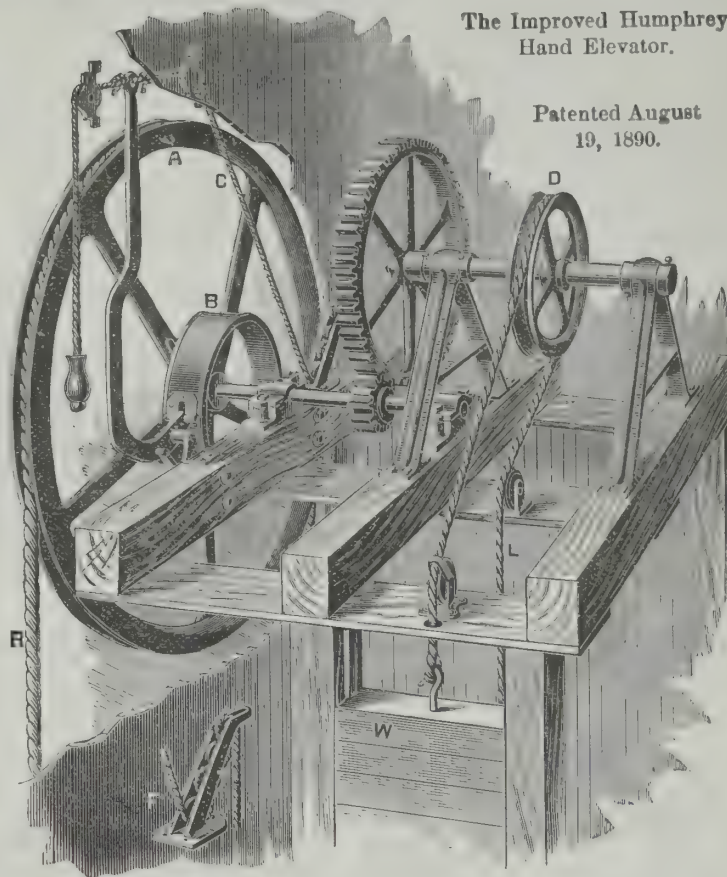
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In reply to your favor of yesterday, the two Hand Power Elevators erected by you in our factory are giving perfect satisfaction. Your workmen who erected them knew their business, and were highly satisfactory to us. The elevators run perfectly, are quiet, and give no trouble under hard usage.

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By FRANCIS R. UPTON, General Manager.

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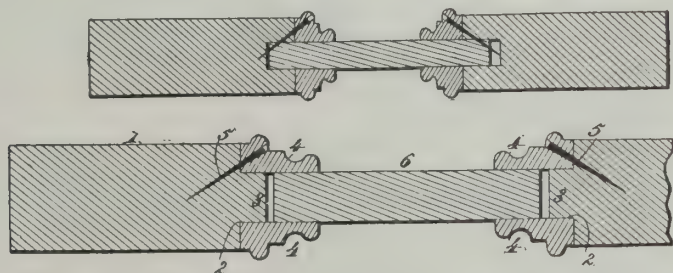


The Improved Humphrey Hand Elevator.

Patented August 19, 1890.

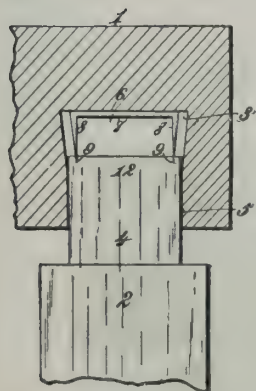
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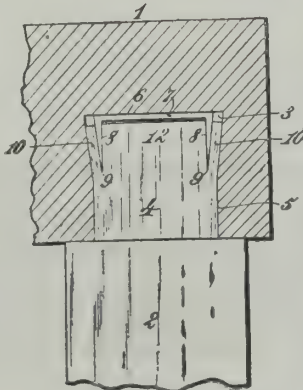
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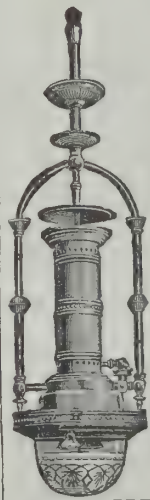
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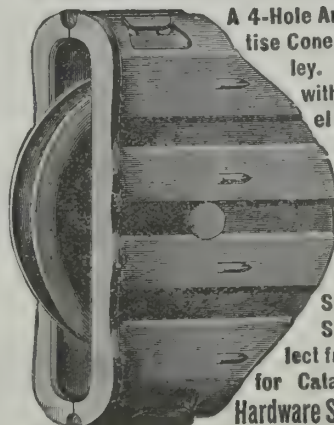
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given entire satisfaction.

Yours truly,  
*Wm. Hall*  
Chief Engineer.

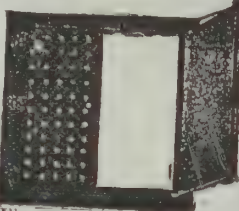
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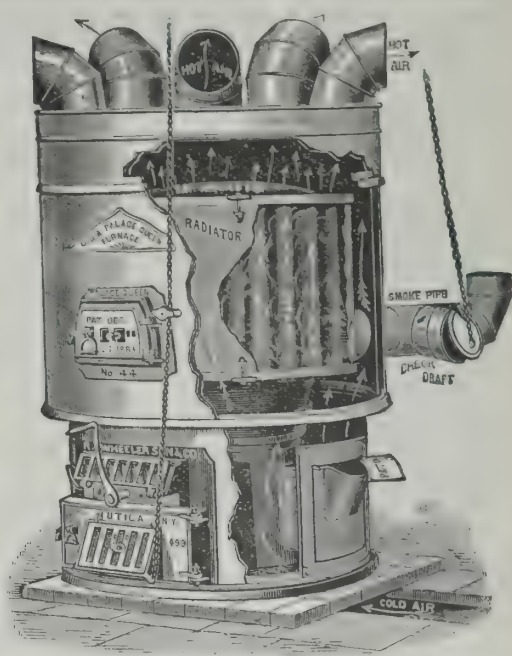
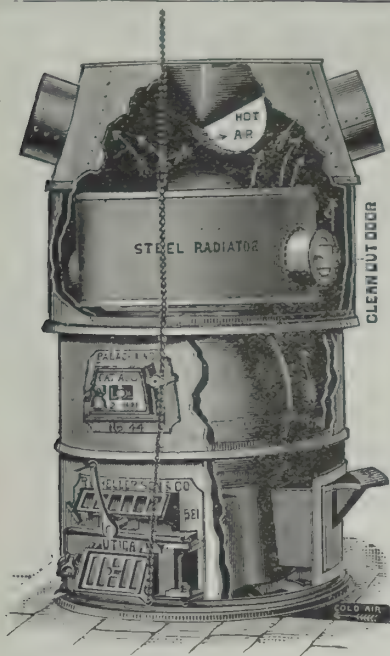


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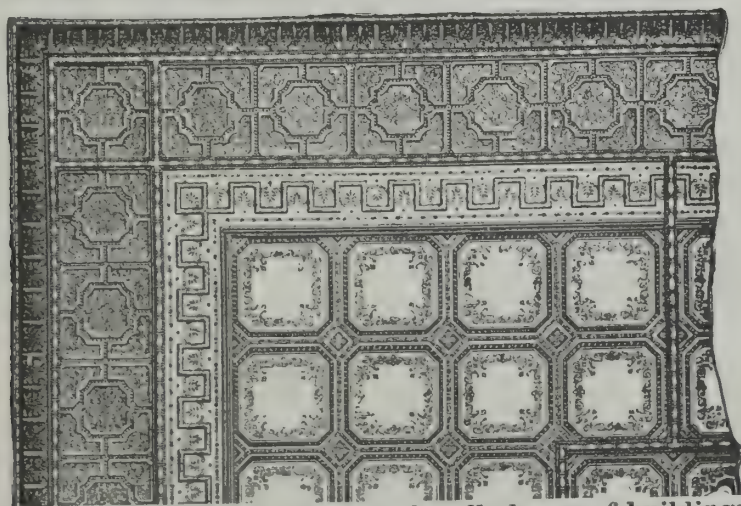


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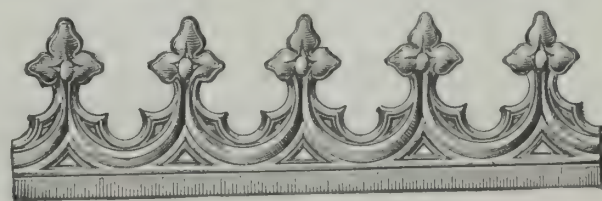


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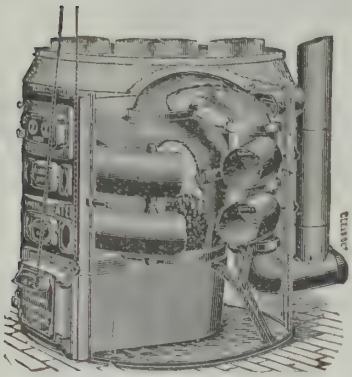




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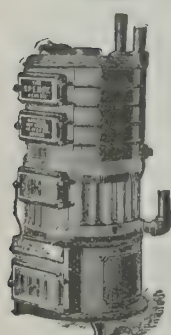
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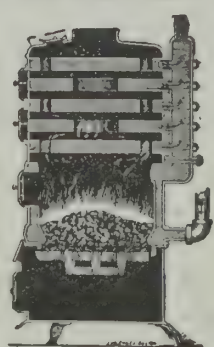
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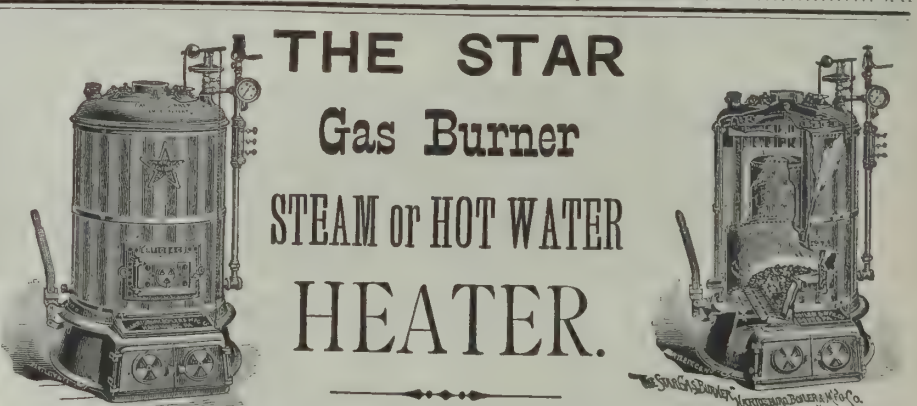


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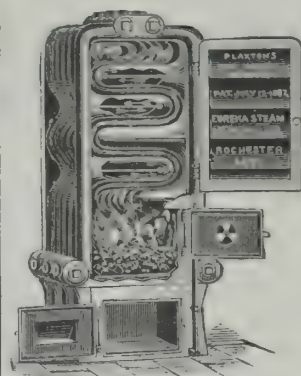
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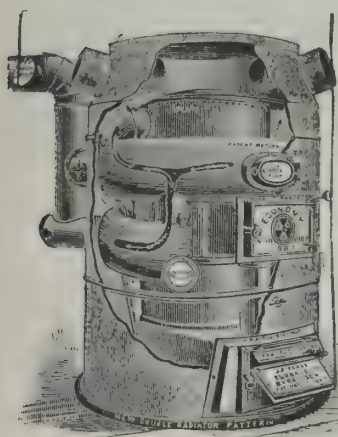
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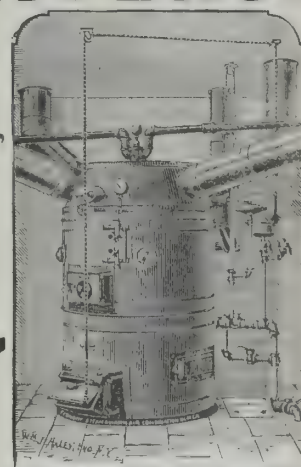
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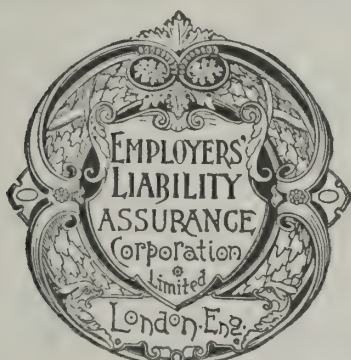
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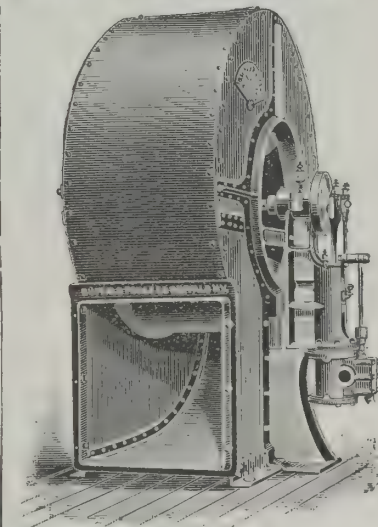
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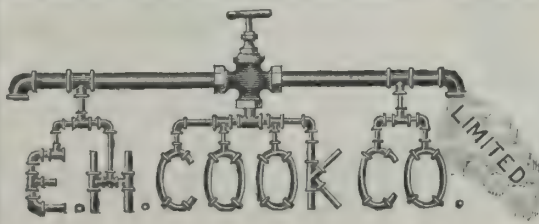
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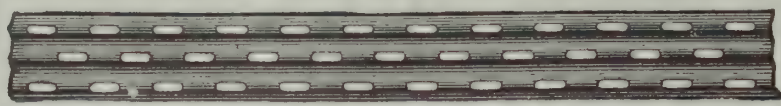
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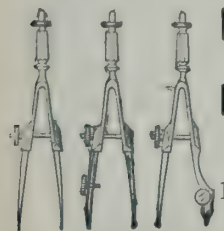
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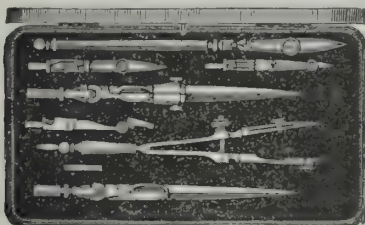
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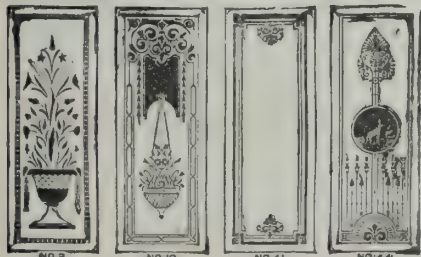
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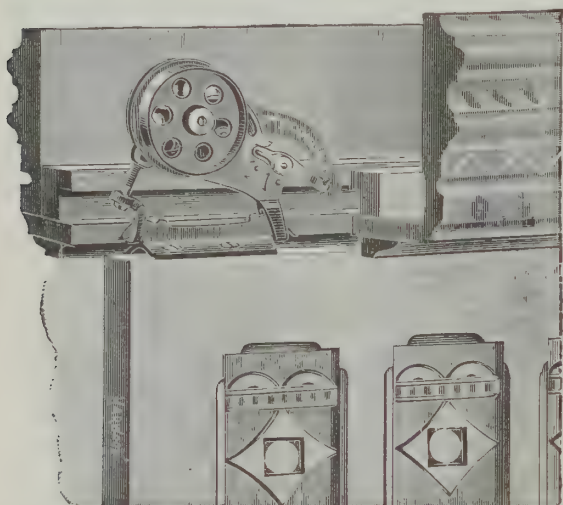


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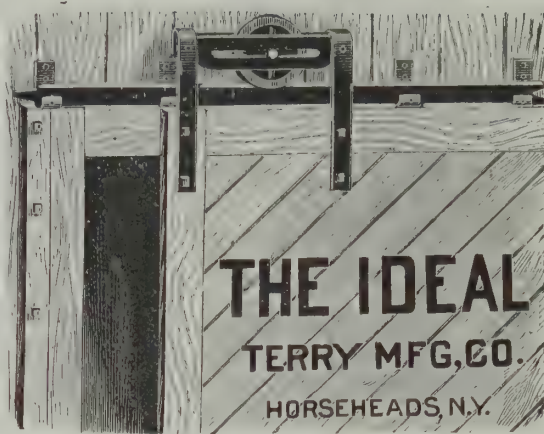
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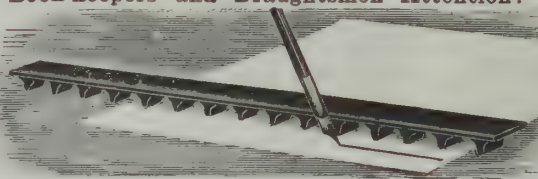
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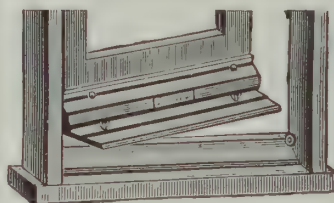


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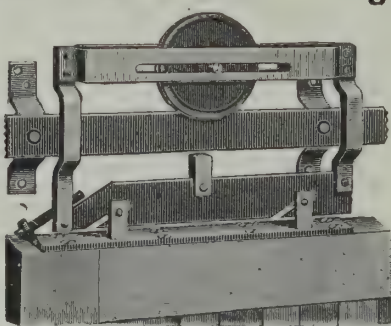
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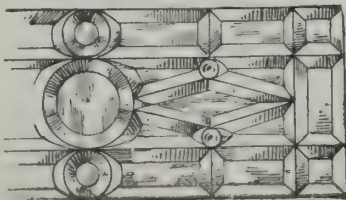
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## Notes and Queries.

(1) J. B. S. writes: Would you have the kindness to give me a simple rule, and an illustration of the following: How many superficial feet are there in a marble slab  $\frac{3}{8}$  inch thick and 18 by 18 inches? A. The superficial feet in one face are given by multiplying the width and length together, both expressed in inches or in feet. If in inches, the product is divided by 144 to reduce to superficial feet. If to be reduced to feet one inch thick, multiply by seven and divide by eight. Thus 18 by 18 =  $2\frac{1}{4}$  superficial feet. This reduces to  $1\frac{1}{2}$  superficial feet one inch thick. If the entire superficies, both sides and edges, is meant, we must take double the area of a single face to give both sides and add the product of  $\frac{3}{8}$  by 72 inches (the perimeter) = 63 square inches or  $\frac{7}{8}$  superficial foot. The total therefore is  $2\frac{1}{4} + 2\frac{1}{4} + \frac{7}{8} = 4\frac{1}{2}$  superficial feet.

(2) J. H. M. asks: What chemical change, if any, takes place in the atmosphere of a closed room heated by a red hot stove? A. It is believed that carbon monoxide gas, which is poisonous, can pass through red hot iron. There is some doubt, however, as to how far the action may go, and as to whether it may be enough to be injurious or not.

(3) G. W. L. Asks: How long must two cylinders of tin or galvanized iron, 1 foot in diameter, be to support 200 pounds on the water and not sink over 6 inches? They are to be used in connection with a water cycle and air tight. A. Much depends upon the weight of the iron that you make the shells of, in the computation of the flotation. If made of very light iron and with proper lines for speed, the cylinders should be not less than 12 feet long; 14 feet would give better results. They would not sink 6 inches if of proper lightness.

(4) E. C. L. M. asks how the round wooden eaves troughs and conductors are made. Are the smaller sizes sawed out of the center of the large ones? If so, how? Two gentlemen in this vicinity were once speaking of the size of pipe that could be used as a siphon. One of them, a practical engineer, said that "large pipe would not carry water as high as small pipe of the same length, if it would work at all. The other thought that one would work as well as the other. Which one was in the right? If large pipe will not work, will you please explain why? A. Wooden eaves troughs may be made on a heavy wood-shaping machine. There is no reason why a large pipe siphon will not work efficiently for the full height that any siphon will operate. They only require caution against leakage and provision for keeping out air.

(5) A. A. says: Please allow me to intrude on your valuable time for a decision on a little matter in dispute. The question is, is there any more pressure in the steam space of a boiler than there is at the base of a boiler where the water is? For example, if a locomotive boiler has 100 pounds steam on it, is there 100 pounds pressure in the water leg of the boiler? It is being argued that the pressure is lighter where the water is than in the steam space. A. There is more pressure in the bottom of the boiler leg than in the steam space by the value of the weight of water above. If there is 4 feet of water, there will be about  $1\frac{1}{4}$  pounds more pressure per square inch.

(Continued on page x.)

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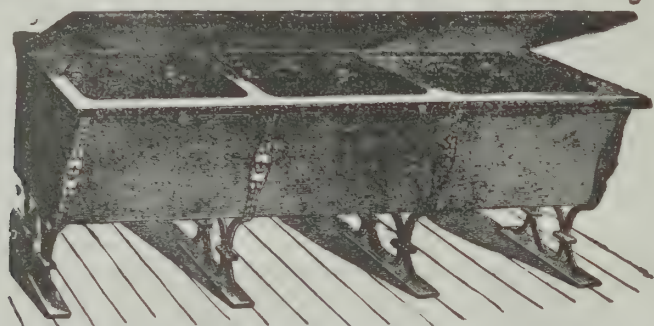
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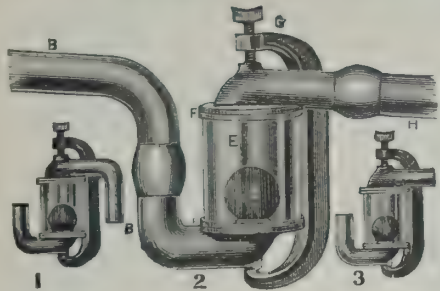


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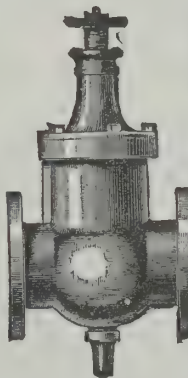
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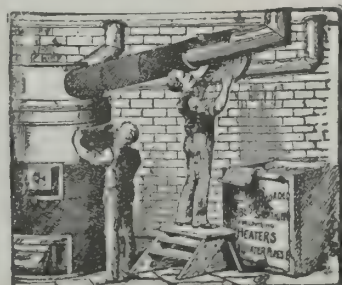


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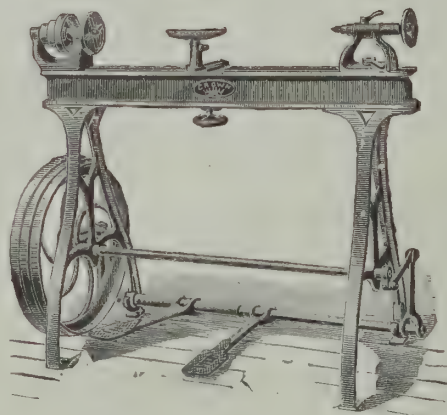


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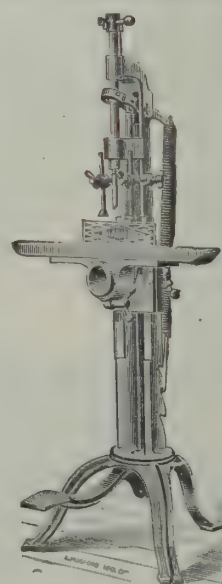
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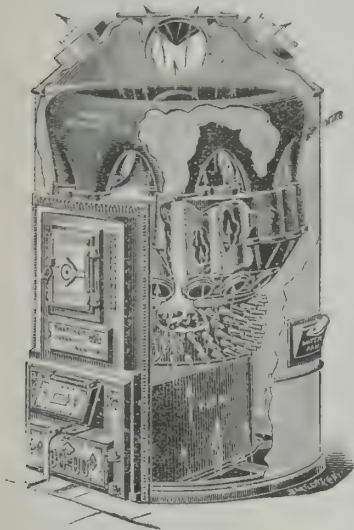
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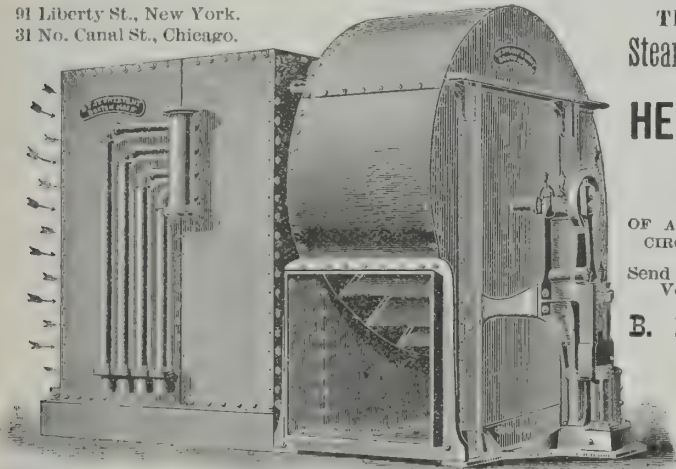
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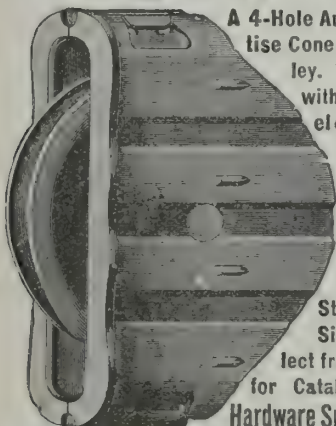
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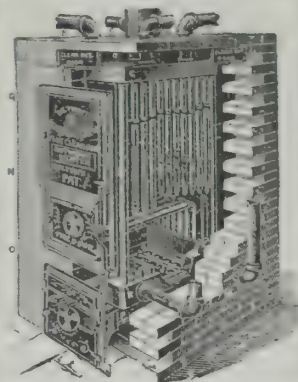
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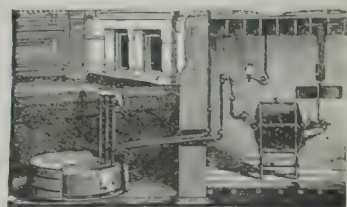
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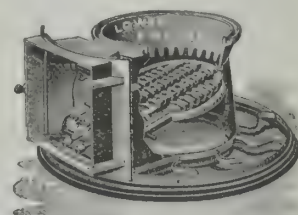
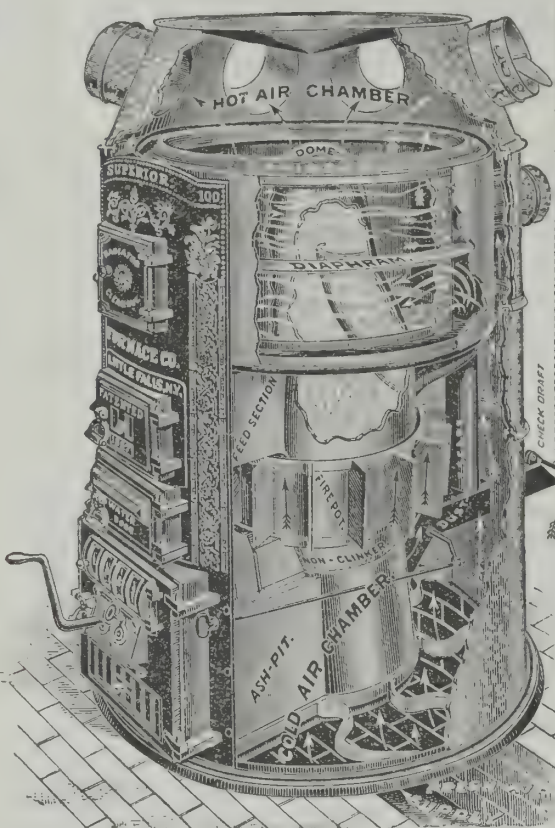
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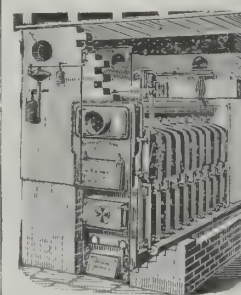
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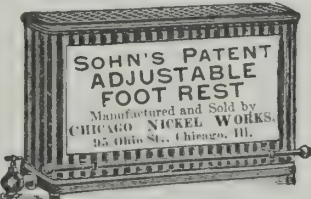
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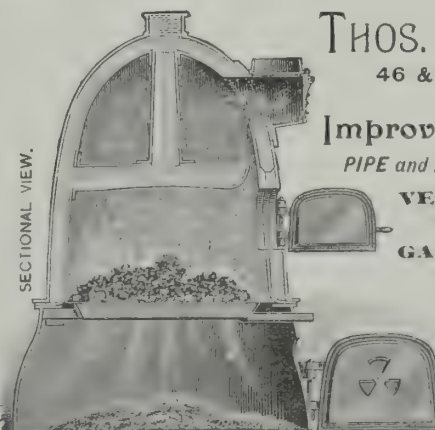
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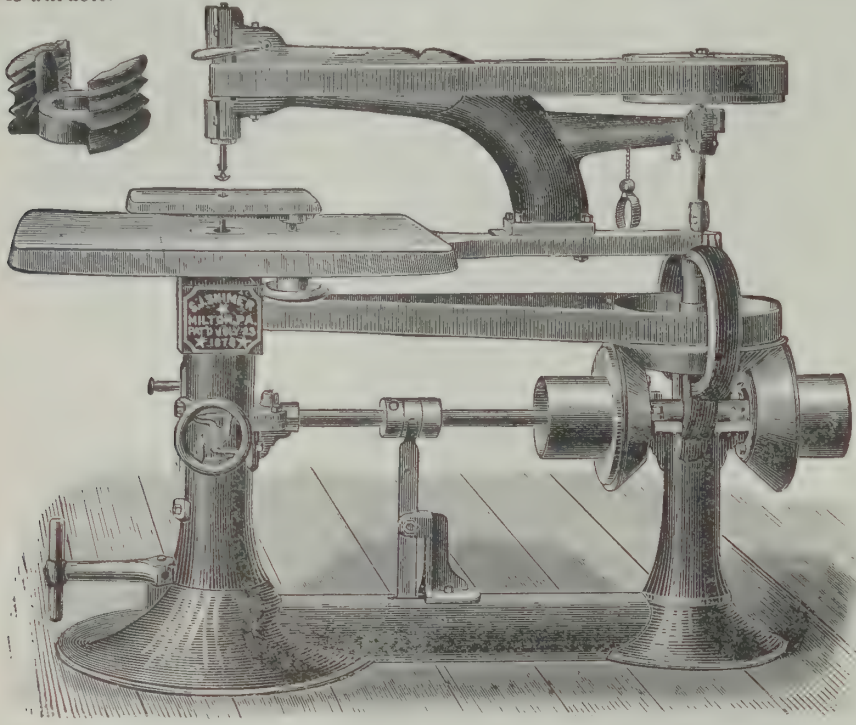


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**FOR SINKING** panels with pattern guided by pin that automatically takes its position when you start the Machine, and drops out of the way when you stop it. The Cutter in the overhanging arm of the Machine has a perpendicular adjustment of one inch, and is operated by the handle shown in the cut attached to an eccentric lever that is automatically locked to the one position when at work.

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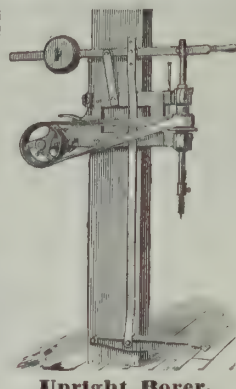
You never tire of the make-up of this Machine, which is as simple and effective as it is durable.



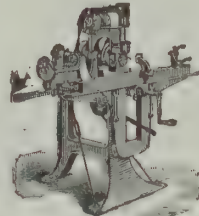
Reversible Cutters for any shape of mould made to order, and warranted to cut free and easy. For Circulars and full information, address,

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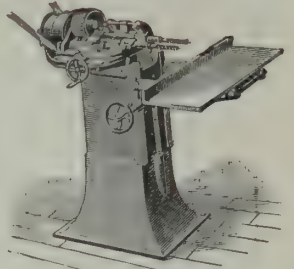
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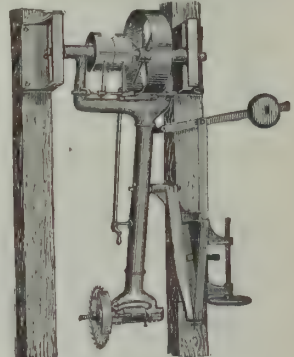
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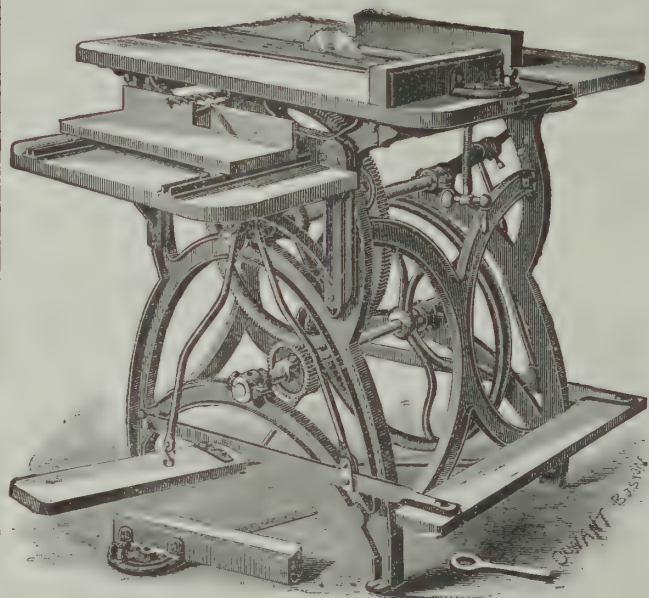
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Double Borer.



Parallel Swing Saw.



**MARSTON'S**  
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**Circular Saw.**

Iron frame 36 inches high. Top 30 x 40 inches, centre part of iron with planed grooves on each side of saw for cutting off gauges to slide in. Ripping gauge slides in iron groove. Steel shafts. Gears are all machine cut from solid iron. Boring table and side treadle. Two 6-inch saws and two cranks with each machine. Weight 350 pounds.

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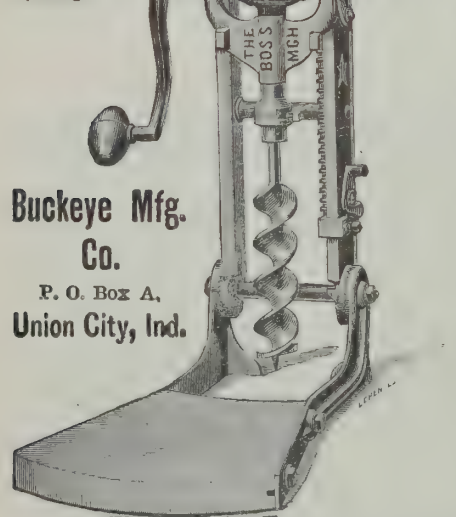
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## The 'BOSS'

TWO SPEED  
BORING MACHINE

Machines with-  
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\$6.00.  
Augers per set  
of 18 gts.  
\$2.25.

With this Machine the operator is enabled to use a two-inch auger with the same effort required in using a one and a one-half inch in any other machine, and for the small auger have a speed two and one-half times faster. Two augers may be kept in the machine, to use either of which it is only necessary to point it downward by first taking the gear frame out of main frame, inverting and replacing it.



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Send Stamp for Catalogue.

(Continued from page vi.)

(6) S. asks: What is the composition of ordinary japan? A. "Japan" has several meanings. The liquid drier contains linseed oil, litharge, and often some salt of manganese. For japanning tin or metal by heat the basis is linseed oil to which some gums and other ingredients are added. Black japan is made by dissolving 48 pounds Naples or certain other foreign asphalts in 10 gallons of linseed oil; 8 pounds of gum animi are mixed with 2 gallons of hot oil and added. To this 2 gallons of amber are added, mixed, with 2 gallons more of hot oil; it is boiled for some time, driers are added, and it is thinned with turpentine. Brown japan is a composition of shellac dissolved in linseed oil. In Spon's Encyclopedia a great many formulas for japans for fine japanning are given.

(7) L. B. & Co. ask: Can you give any information regarding the application of steam direct to lumber for the purpose of drying same, prior to putting on blast forcing hot air through same? We have one of B. F. Sturtevant's devices, consisting of fan drawing hot air through a system of tubes having in them steam for the purpose of heating same, but under this process we have not been enabled to raise the temperature of our kiln over 130° F. at highest, and usually we are enabled only to get same from 100° to 120° F. The idea occurred to us, could we first steam the lumber thoroughly, it would be advantageous. A. The blowing of hot air through the lumber is only a superficial drying process. Steaming the lumber and then injecting air for drying at only 130° temperature will not help you. Put heating coils under the lumber, and steam both the lumber and the coils within a tight room, so as to get a temperature of 200°, and then shut off steam from the room, and keep up the heat in the

coils. This drives the moisture from the interior of the lumber. Then ventilation by the hot air blower will season the lumber without checking.

(8) C. B. S., Jr., says: Would you kindly tell us, if you have the data, how much faster the water in the center of an 8 inch pipe will travel than the water around the outside of same pipe at say 60 pounds pressure on the main; and what comparative difference there would be between the water column traveling in the center of a 6 inch pipe and 8 inch pipe, 60 pounds pressure being on both mains; and how much more pressure would be delivered out of the end of the 8 inch pipe than the 6 inch pipe, both pipes being 1,000 feet long and both having 60 pounds pressure at the entrance? A. We have no data as to the retardation of the outer stratum of water flowing through a closed channel or pipe. In open channels the variation increases from the perimeter toward the center, ranging from 75 per cent in parts of the central velocity. The pressure does not materially affect the friction, which is due to velocity. The pressure at the ends of the 6 and 8 inch pipe with equal head pressure will be alike only when there is no water flowing. With open ends the flow will be nearly as the square of their respective diameters. With restricted openings the pressure would be inversely as the proportional area of the holes to the area of the pipes.

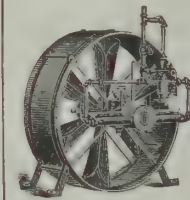
(9) R. R. says: Please inform me what is the velocity of upward flow of water through a smooth iron suction pipe 5 inches diameter, held perpendicularly 15 feet high, with a perfect vacuum? A. With a constant flow under vacuum, the velocity will be 31 feet per second, less the friction of the pipe, which will lessen the velocity about 3 feet, or a resultant of 28 feet per second.

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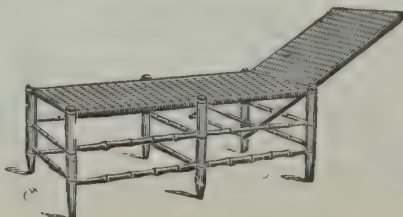
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Sinclair Cottage Table.



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**Sinclair's Common Sense Chairs.**

My address is stamped on all my chairs. Please find it before purchasing. Send stamp for Illustrated Catalogue.

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Gen. Grant Chair.

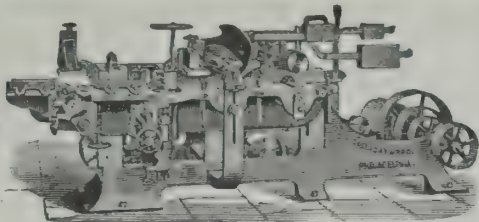




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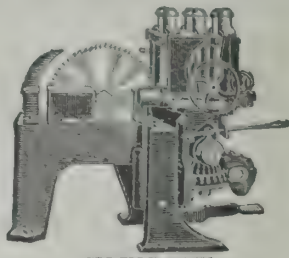
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Woodworking Machinery, Planers and Matchers, Pony Planers, Hand Matchers, Solid Plate and Segment Re-Saws

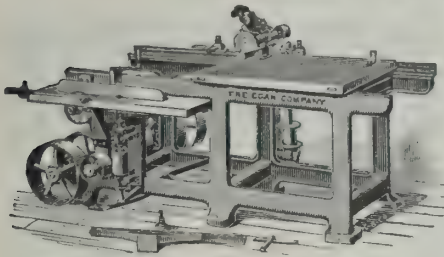


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Sash, Blind and Rabbetting, Jointing and Finishing Machine.

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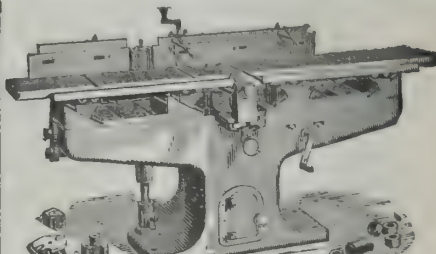
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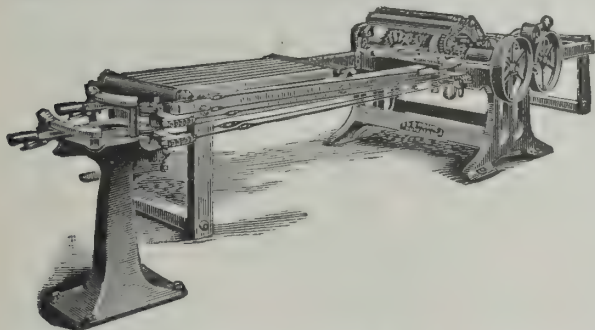
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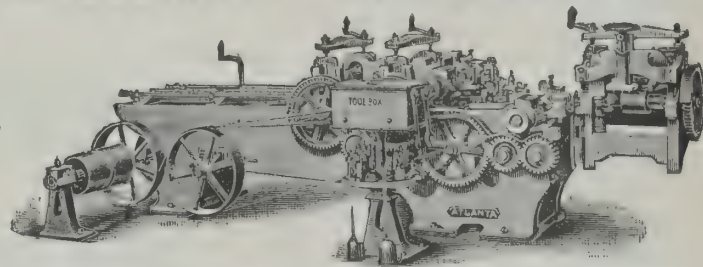
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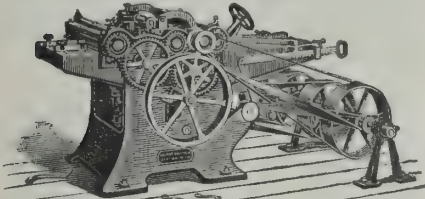


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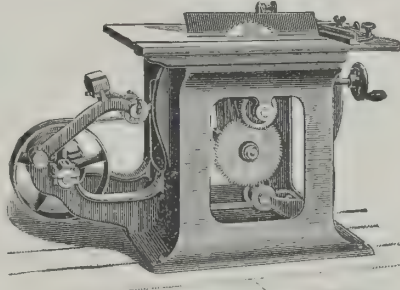
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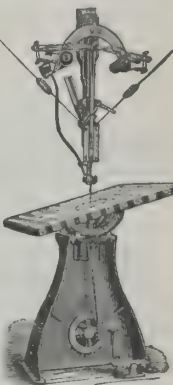
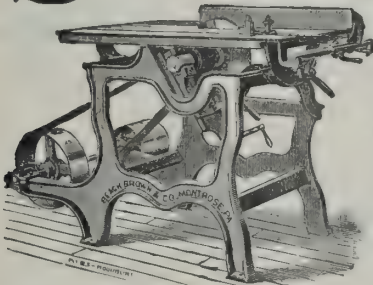
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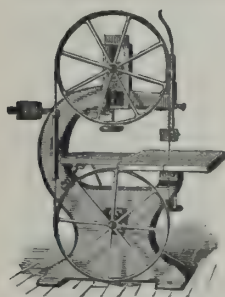
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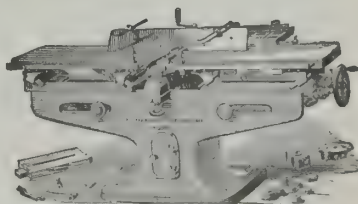
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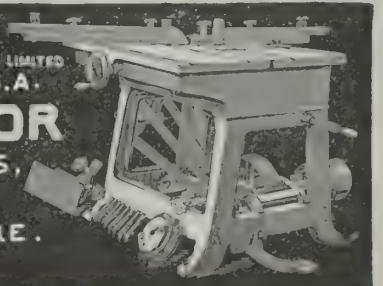
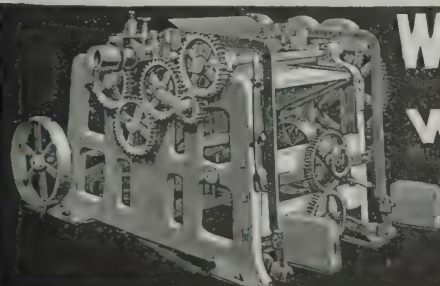
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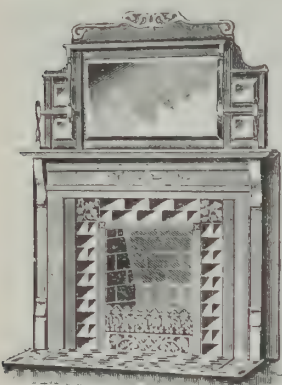
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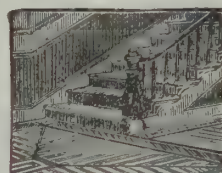
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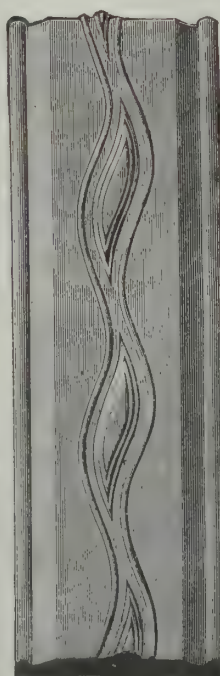
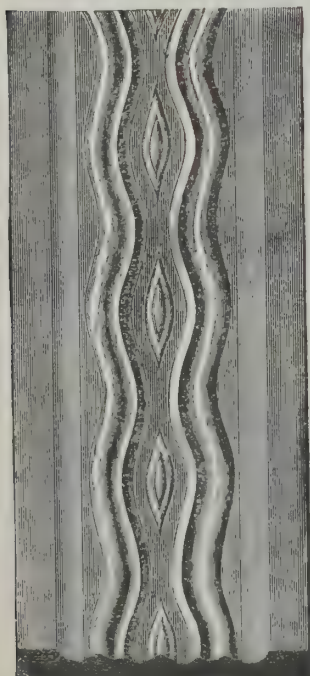
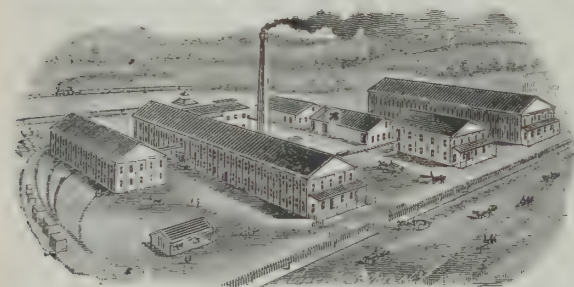
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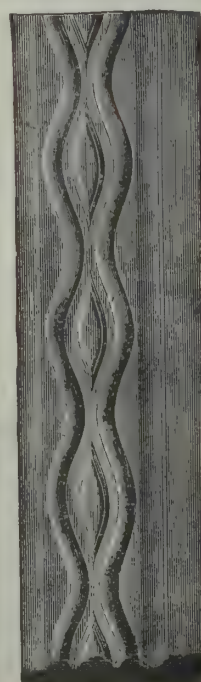
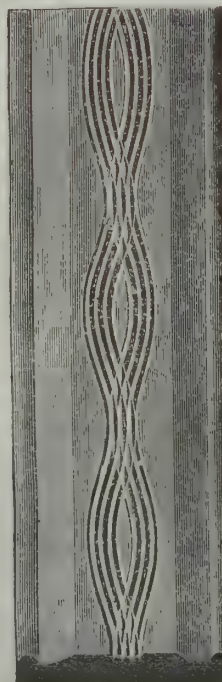
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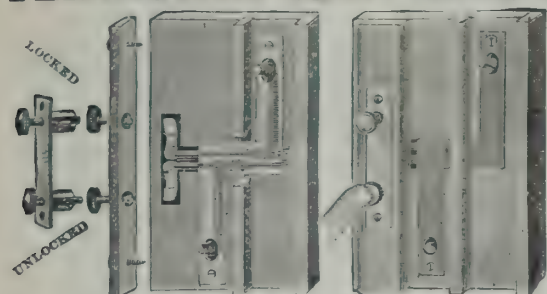
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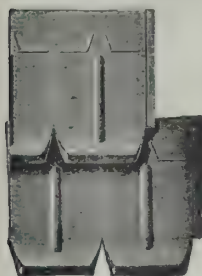


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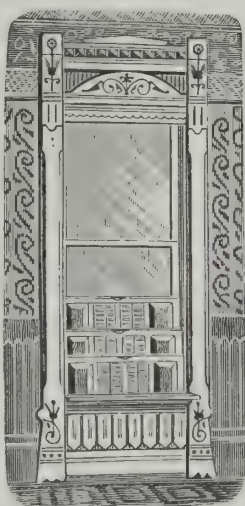
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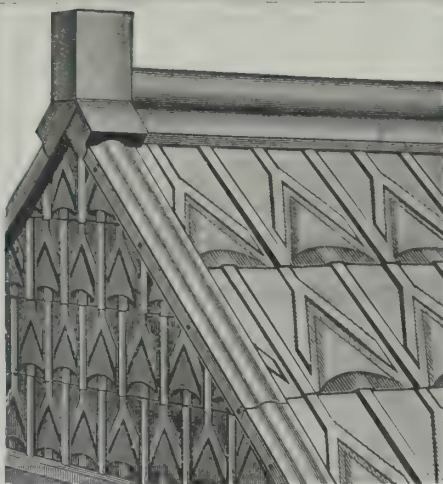
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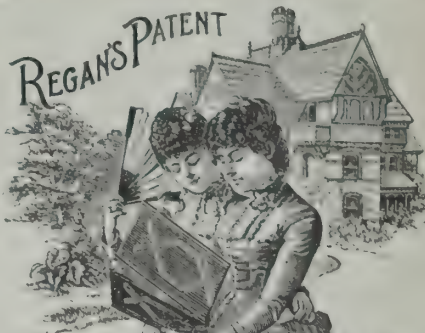
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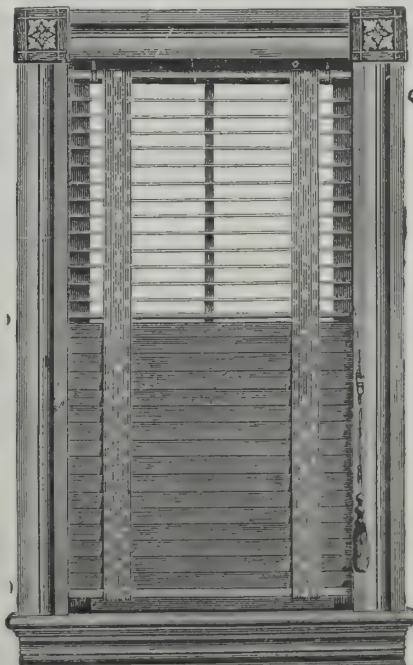
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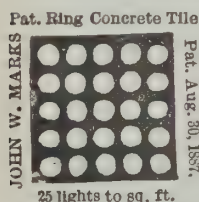
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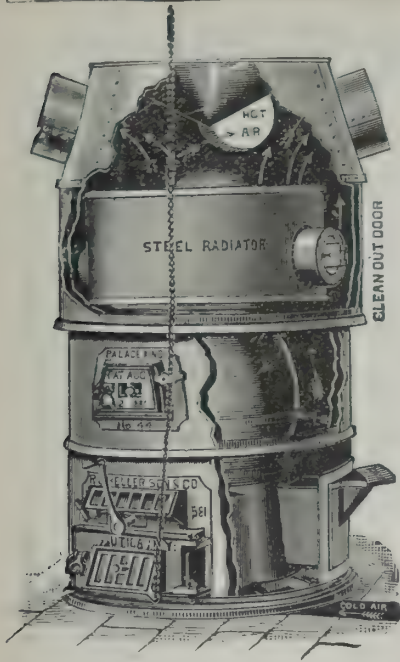
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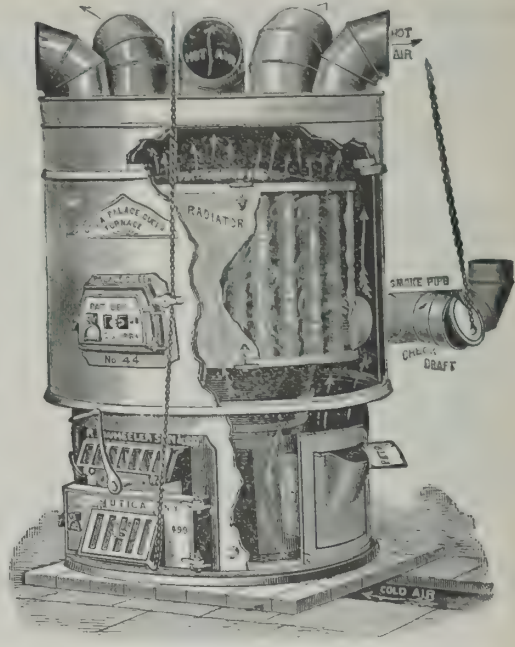


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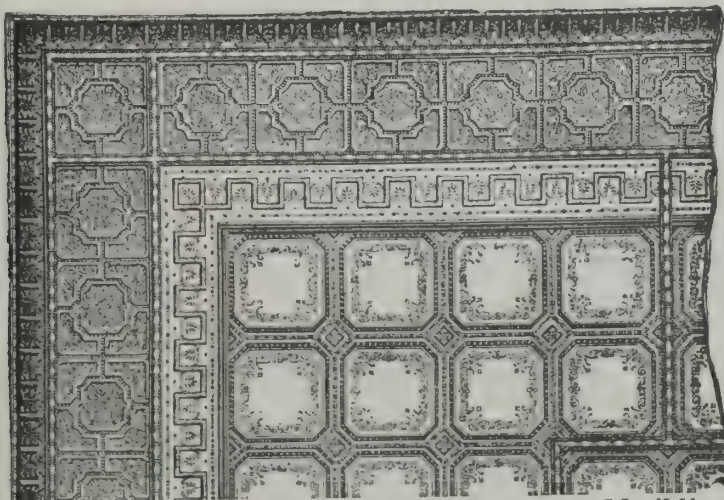


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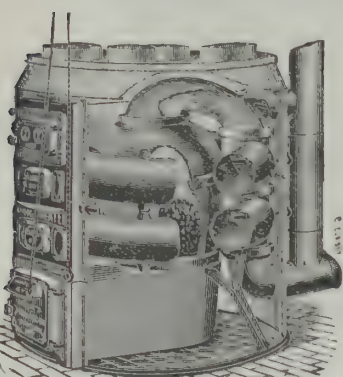
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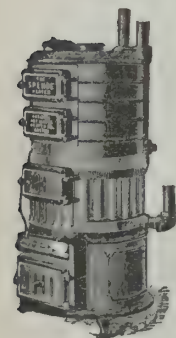
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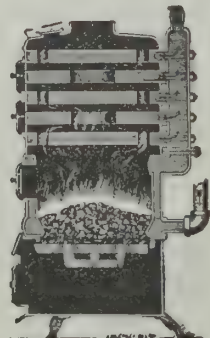
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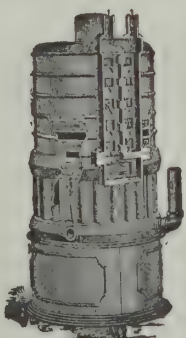
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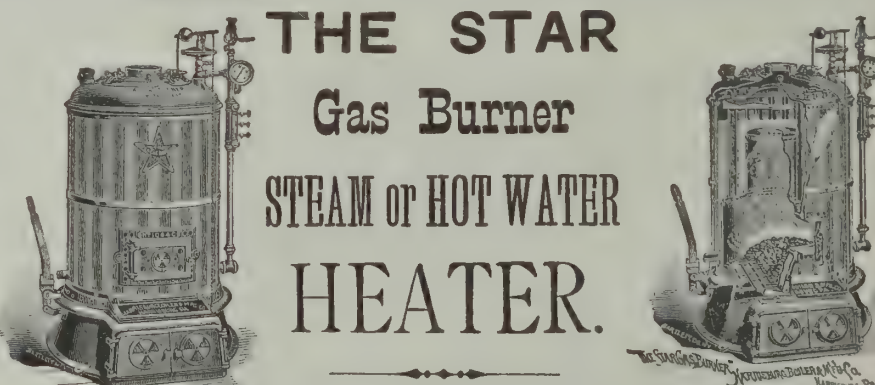
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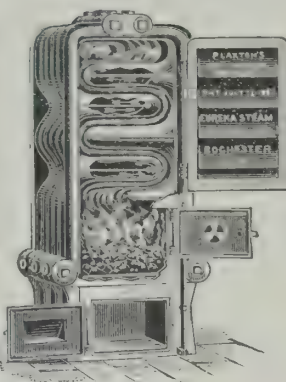
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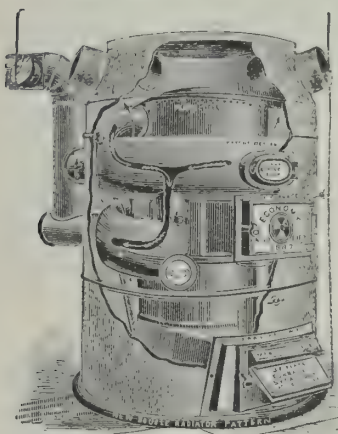
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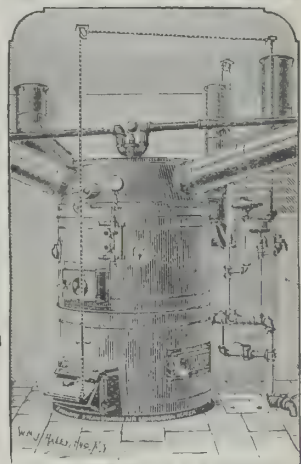
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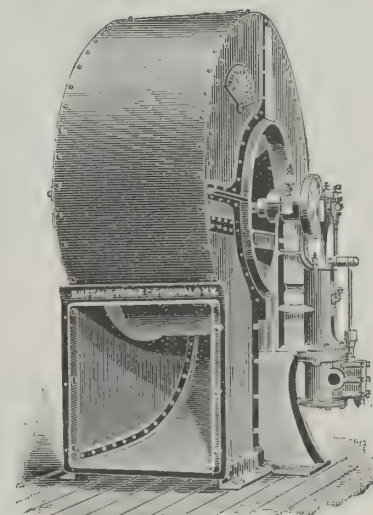
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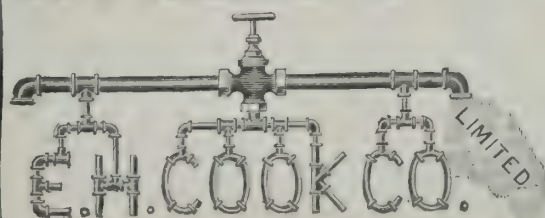
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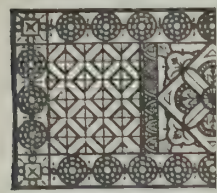
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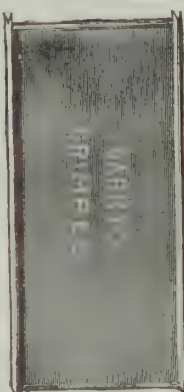
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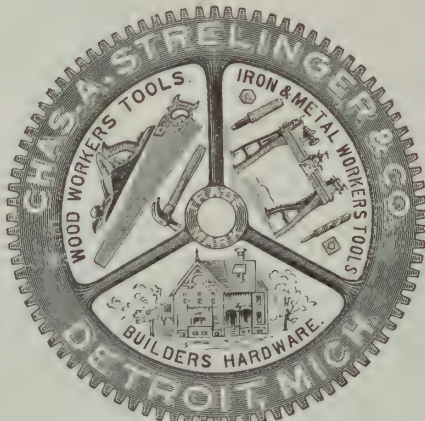
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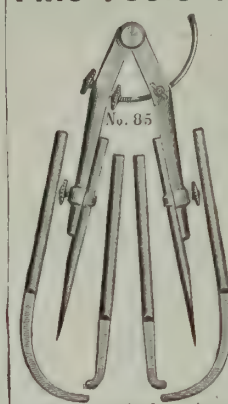
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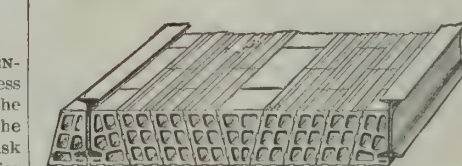
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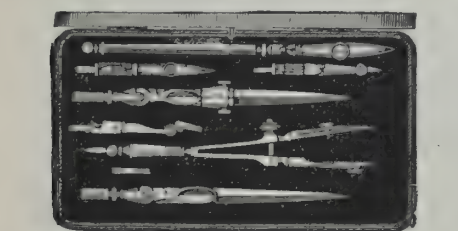
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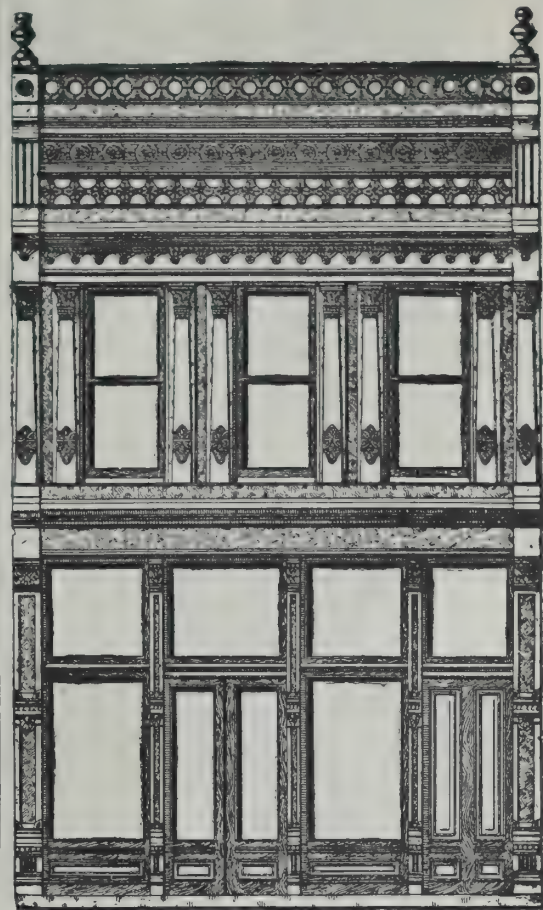


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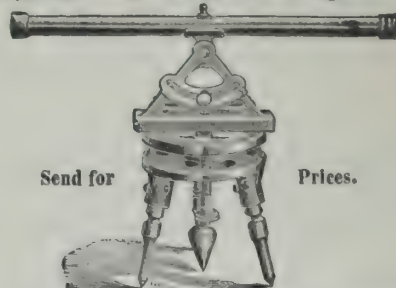
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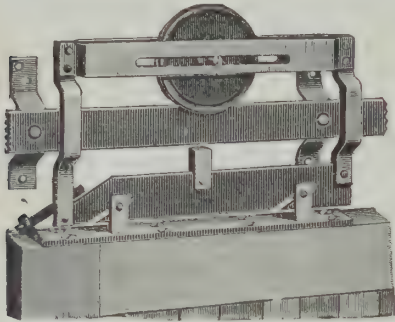
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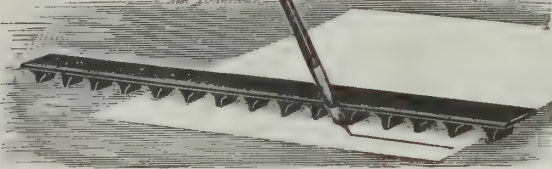
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(Continued on page vi.)

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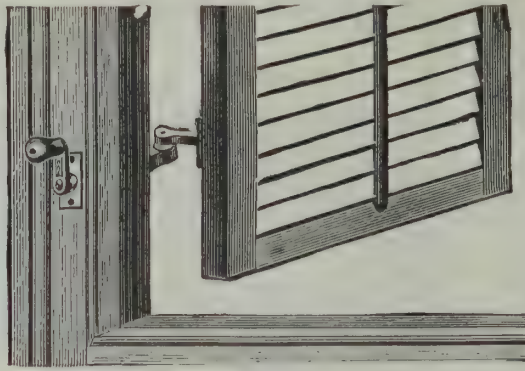
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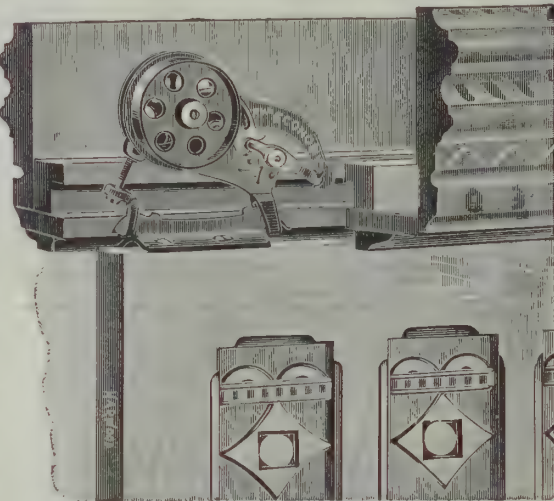
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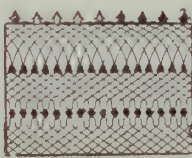
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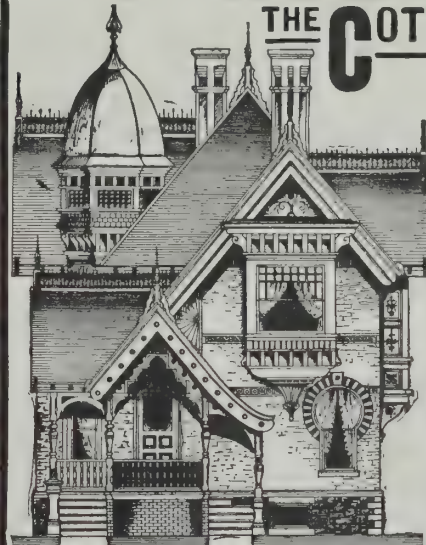
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(Continued from page iv.)  
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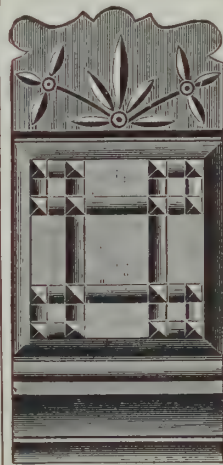
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(Continued on page x.)

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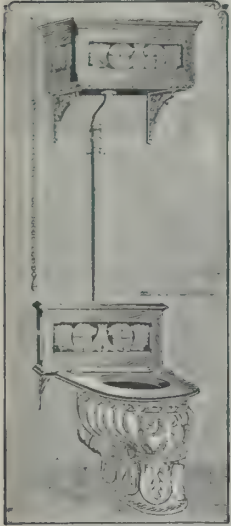
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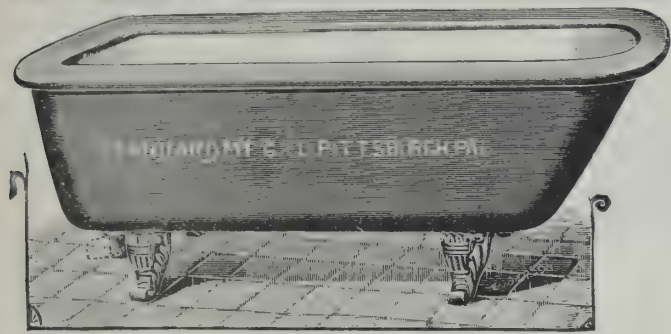
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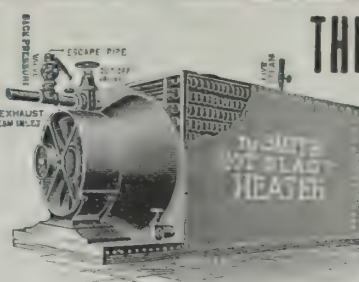


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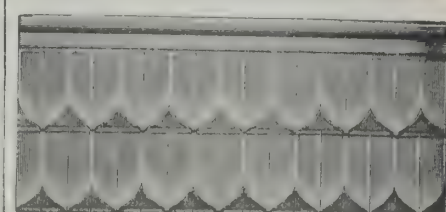
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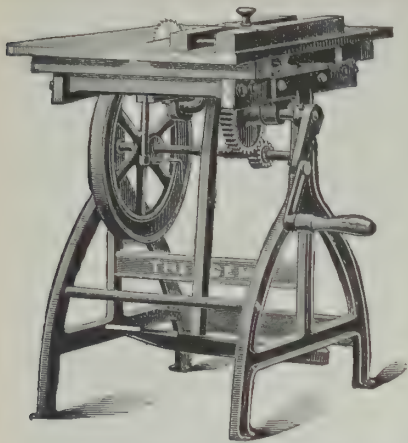
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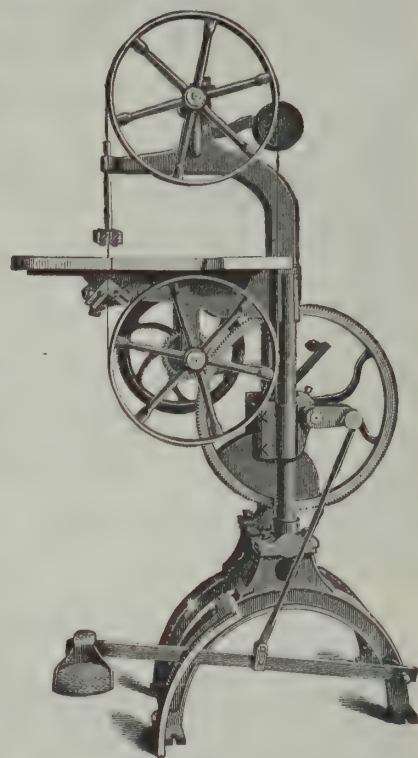


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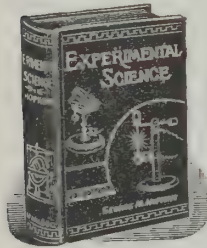
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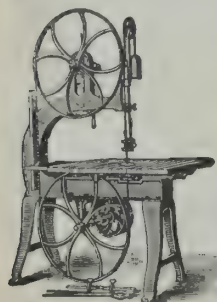
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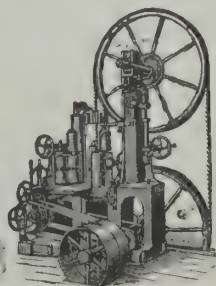
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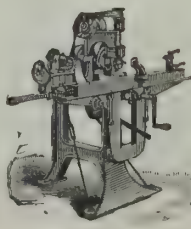
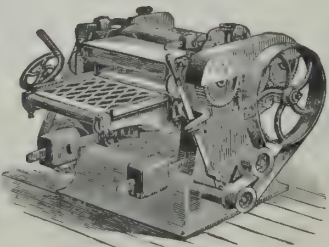
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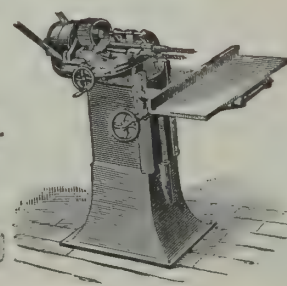
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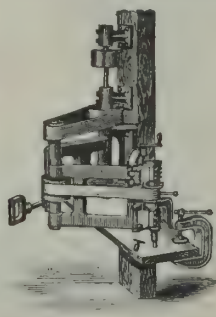
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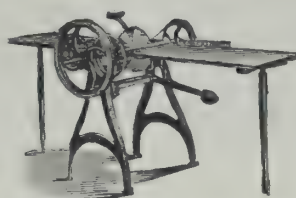
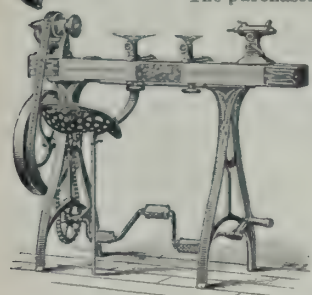


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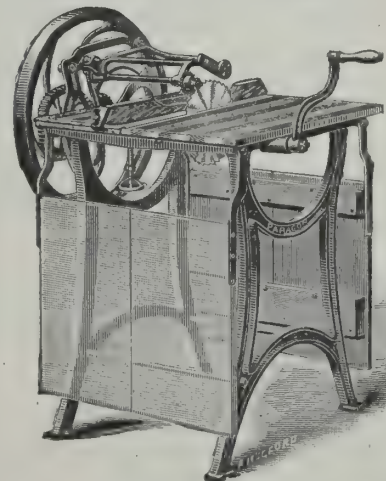
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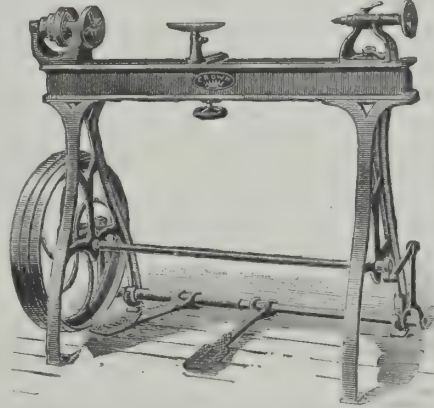
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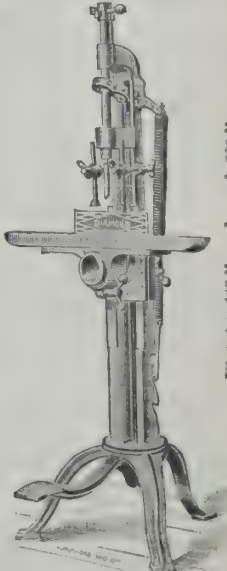
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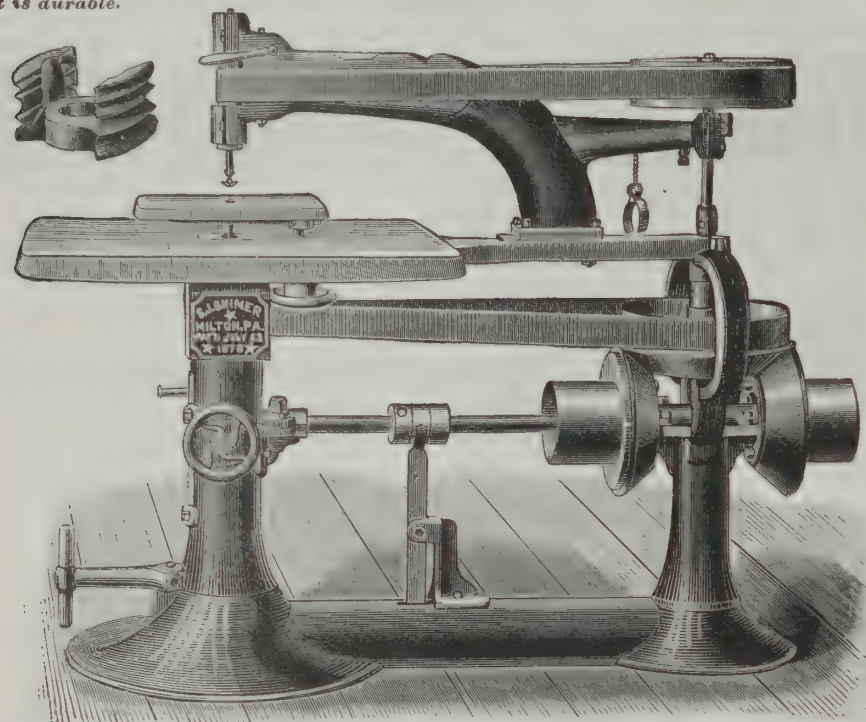


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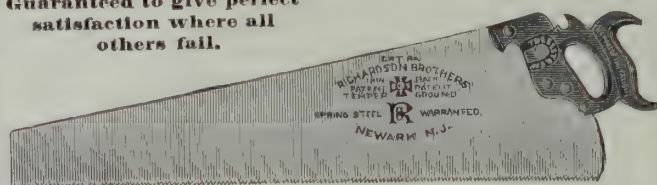
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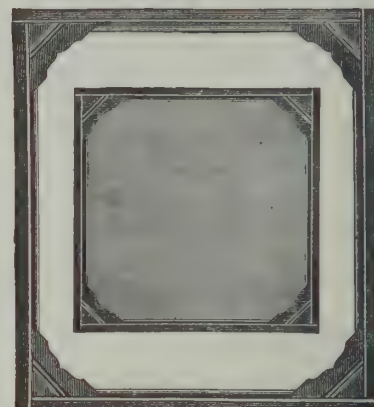
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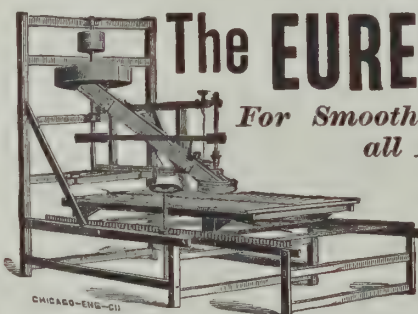
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(Continued from page vi.)

(10) T. H. asks for a recipe for removing stains from a marble hearth, caused by burning of note or letter paper (I suppose sized) on the same. A. Take 2 parts of common soda, 1 part of pumice stone, and 1 part of finely powdered chalk; sift it through a fine sieve, and mix it with water; then rub it well all over the mouth of the bottle with a piece of bladder, keeping it in a warm place for three or four days, with occasional shaking, then filtering the liquid. The wood is first mordanted with nitric acid, and when dry washed with the stain once or oftener, according to the desired shade; then the wood, being dried, is oiled and polished. For light mahogany: Same as dark mahogany, but the stain should be applied once. The veins of true mahogany may be imitated by the use of iron acetate skillfully applied.

(11) W. S. asks for one of the latest receipts for staining cherry a mahogany color. A. For dark mahogany: Introduce into a bottle 15 grains of alkanet root, 30 grains aloes, 30 grains powdered dragon's blood, and 500 grains 95 per cent alcohol, closing the mouth of the bottle with a piece of bladder, keeping it in a warm place for three or four days, with occasional shaking, then filtering the liquid. The wood is first mordanted with nitric acid, and when dry washed with the stain once or oftener, according to the desired shade; then the wood, being dried, is oiled and polished. For light mahogany: Same as dark mahogany, but the stain should be applied once. The veins of true mahogany may be imitated by the use of iron acetate skillfully applied.

(12) T. H. P. asks: 1. At what elevation must a tank of water be placed to give a pressure of 100 pounds on 1 inch pipe? A. 224 feet. 2. Does pressure

vary with size of pipe? A. Pressure per square inch is the same without reference to size of pipe. 3. Is pressure greater if the pipe is more nearly perpendicular? A. Pressure is derived from the vertical height. Length of pipe may vary without affecting pressure. 4. Does size of tank make any difference? A. No. 5. Can you give rule for obtaining pressure given from different heights and sizes of pipe? A. Divide the height in feet by 2.39 for pressure in pounds per square inch.

(13) F. N. D. asks if a cast iron gas main will rust on the inside, when it is in constant use for supplying gas, if water that is made to absorb all the salt that it will hold is run through it? The water does not stay in pipe, but runs off at once. A. We think that the application of salt water in the manner proposed would not secure any beneficial result.

(14) C. G. B.—The sudden turning on of steam at high pressure to heating pipes is dangerous to the pipes and fittings. The pipes always contain more or less water when cold, and the sudden accumulation of water of condensation from the rushing steam upon the cold pipes accumulates water that cannot be instantly drained away; and as water is comparatively a solid body, it dashes along the pipes under the force of the incoming steam, producing concussions like hammering upon the pipes, and in its confined condition produces great strain upon the pipe and fittings, often bursting forth.



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Premium Receipts in 1890, - -	\$4,010,225.50
Interest Receipts in 1890, - -	1,786,096.52
Total Receipts during the year, -	5,796,322.02
Disbursements to Policy-holders, and for expenses, taxes, etc., -	4,535,380.74
Assets January 1, 1891, - - -	35,993,002.37
Total Liabilities, - - - - -	30,134,206.66
Surplus by Conn., Mass., and N. Y. standard, - - - - -	5,858,795.71
Policies in force January 1, 1891, 74,014, insuring, - - - - -	117,656,381.00
Policies issued in 1890, 10,552, insuring, - - - - -	21,206,702.00

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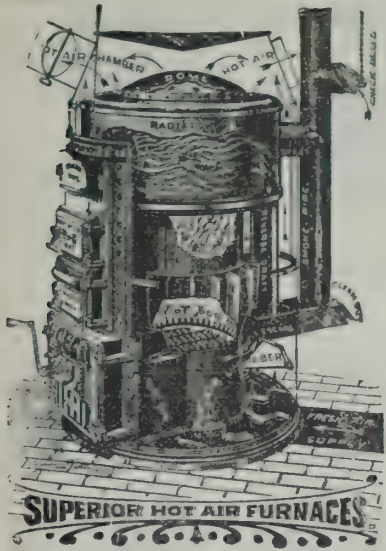
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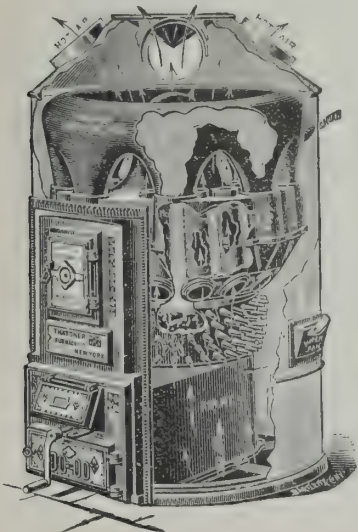


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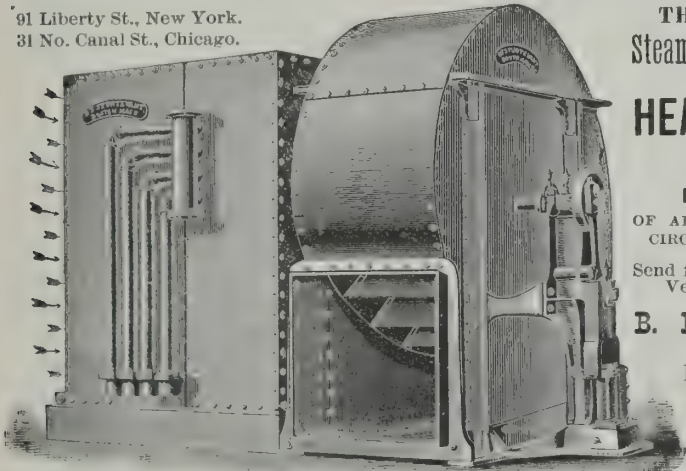
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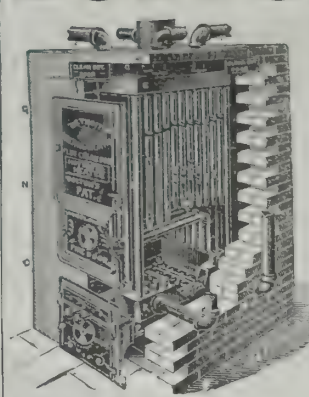
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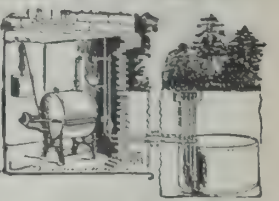
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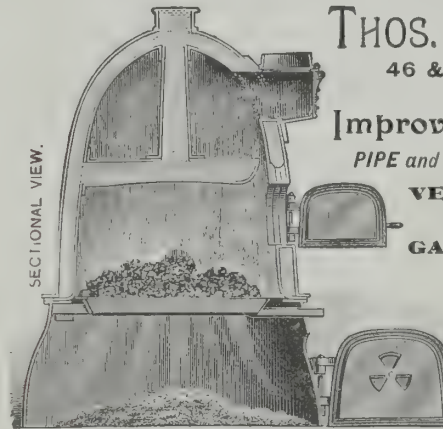
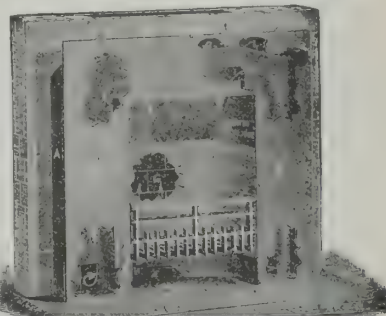
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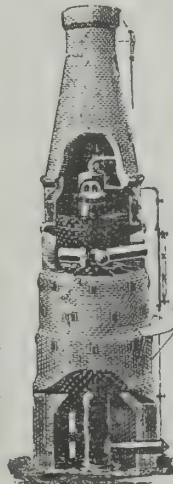
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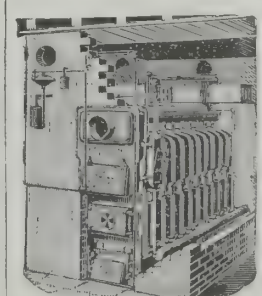
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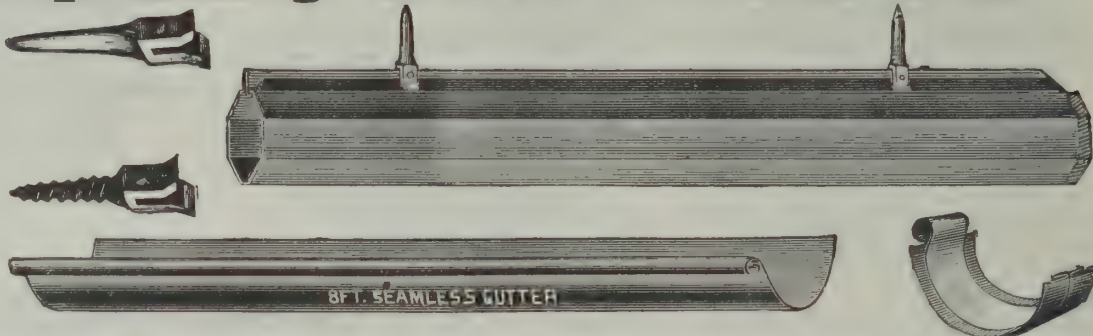
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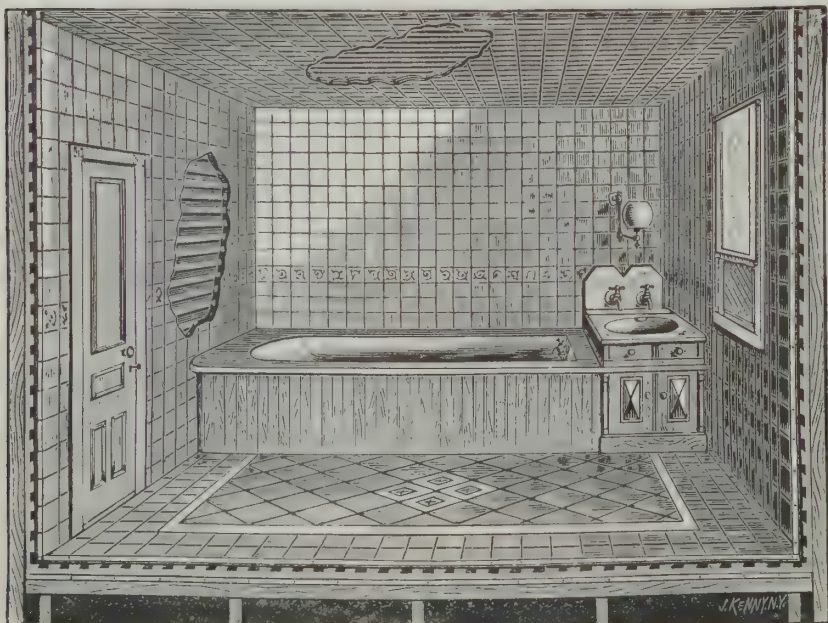
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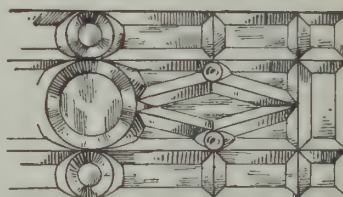
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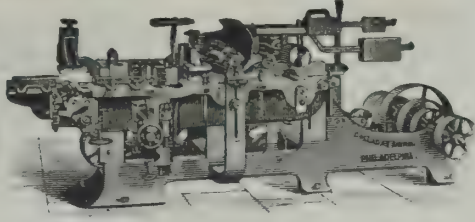




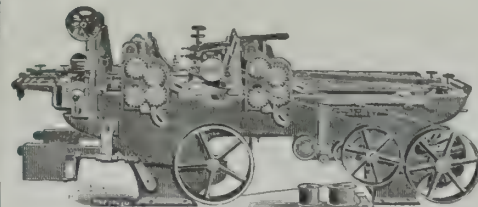


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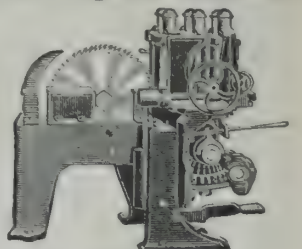
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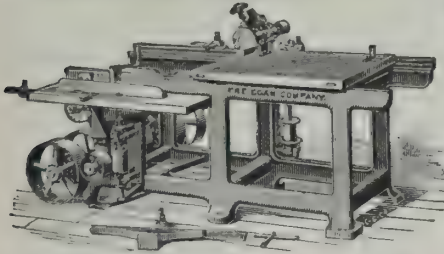


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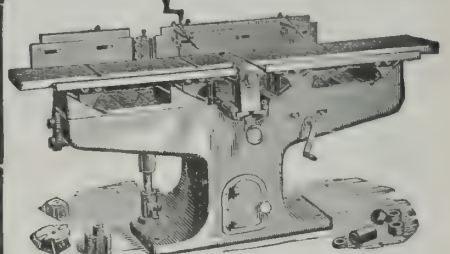
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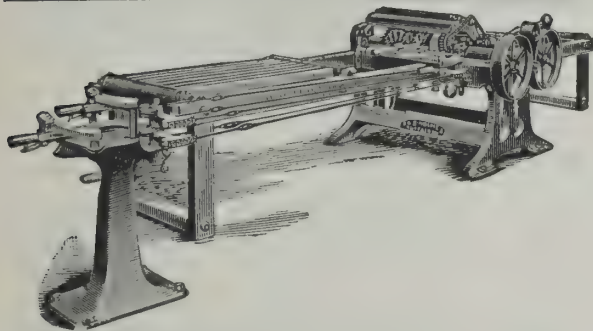
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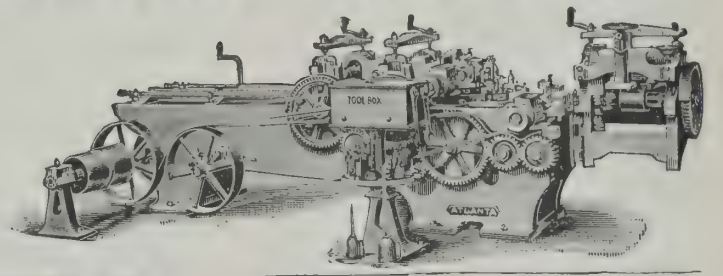
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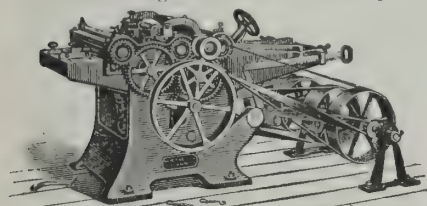


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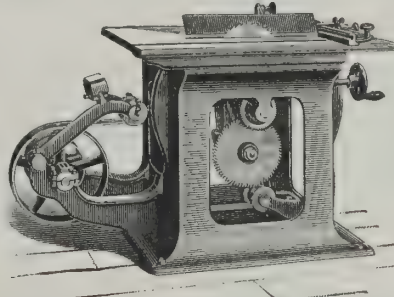
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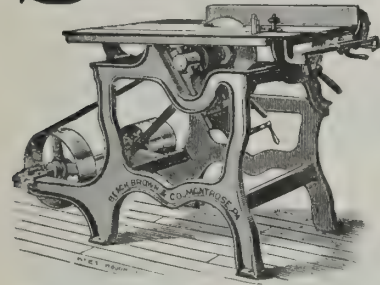
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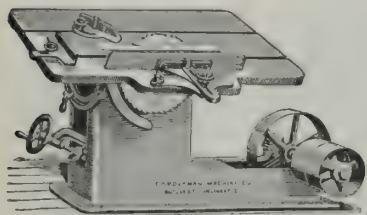
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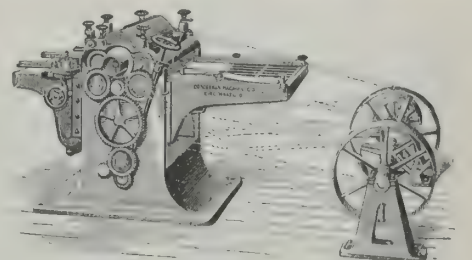
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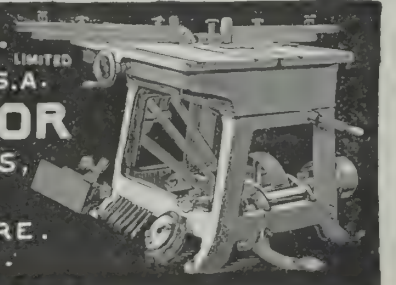
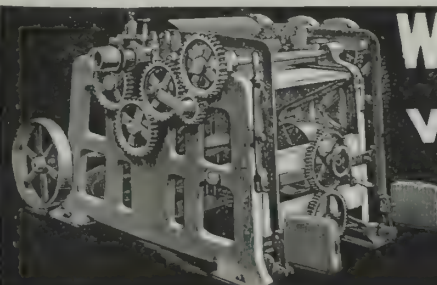
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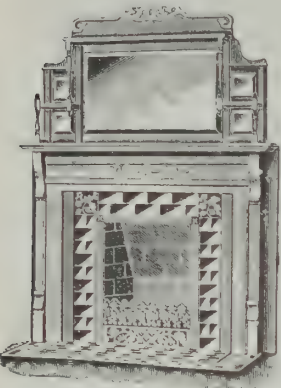
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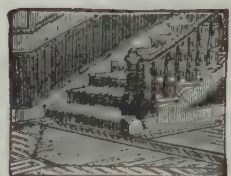
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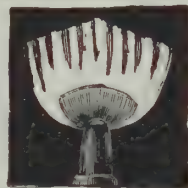
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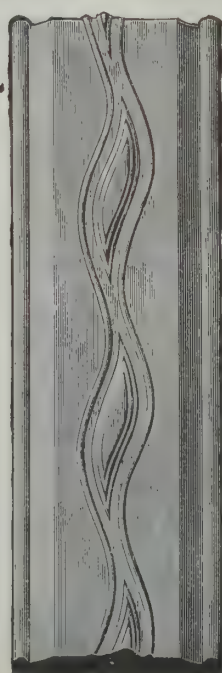
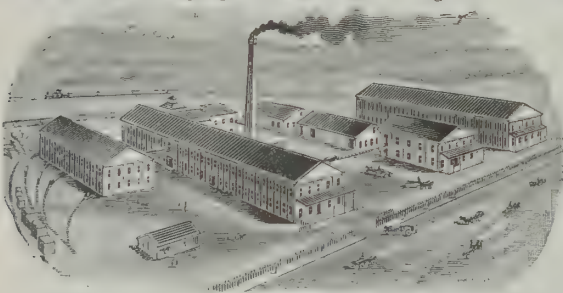
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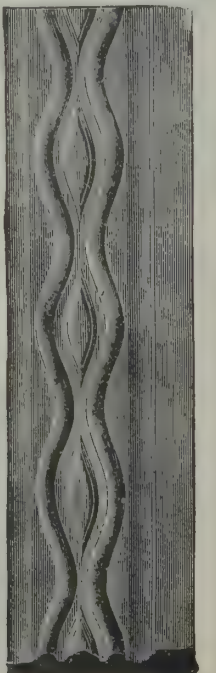
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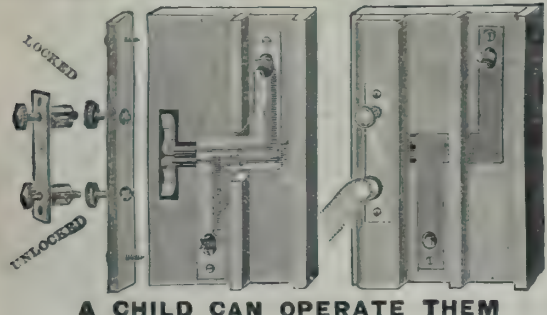
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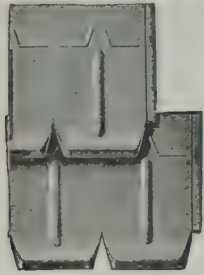
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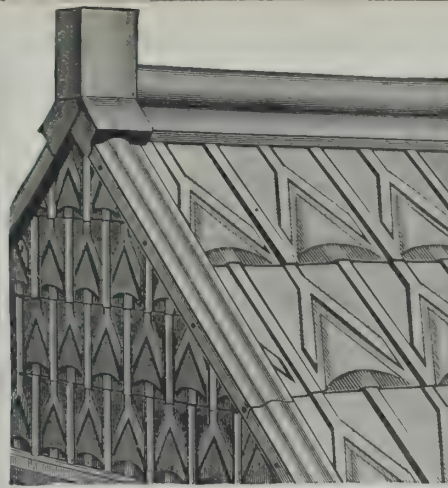
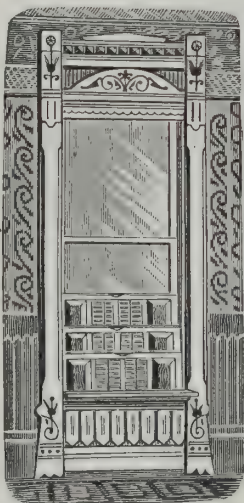
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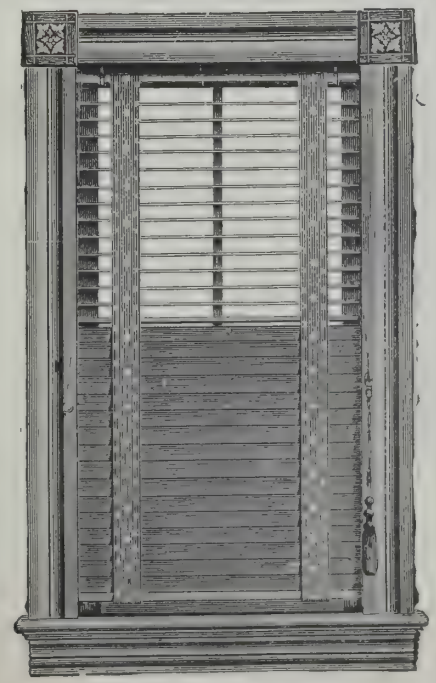
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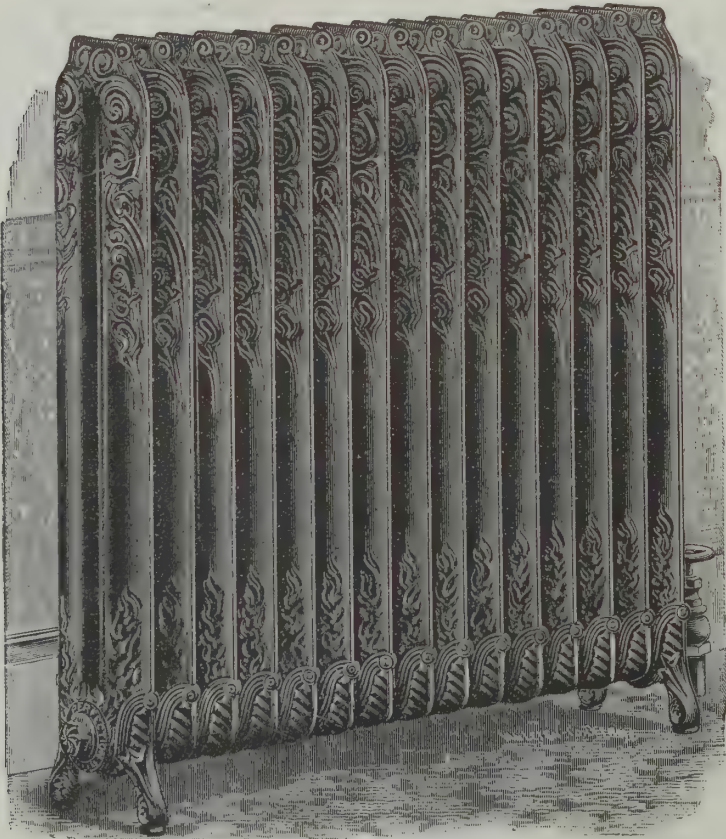
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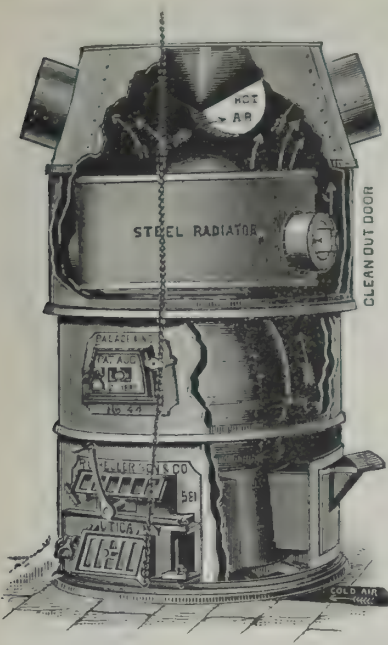
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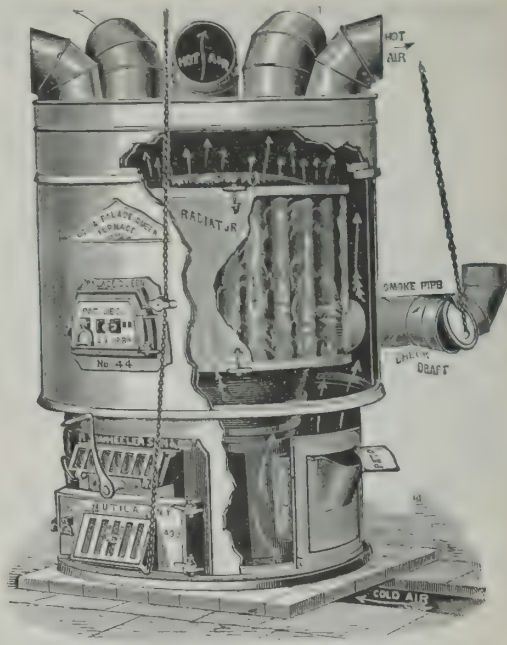




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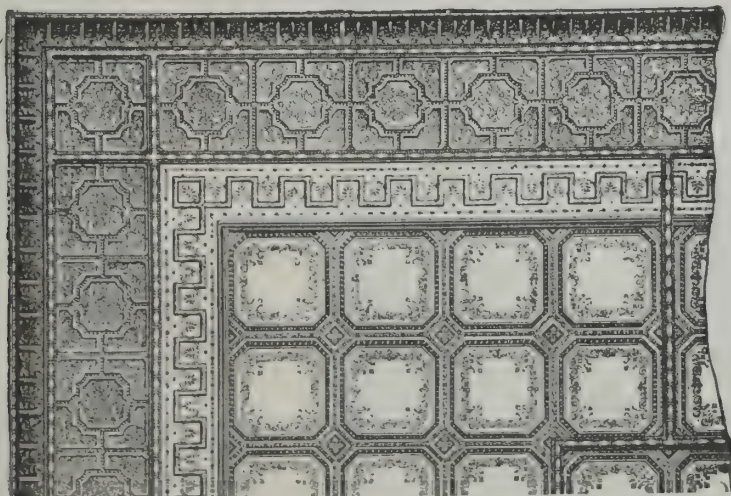


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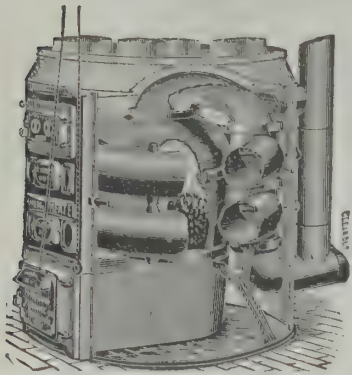
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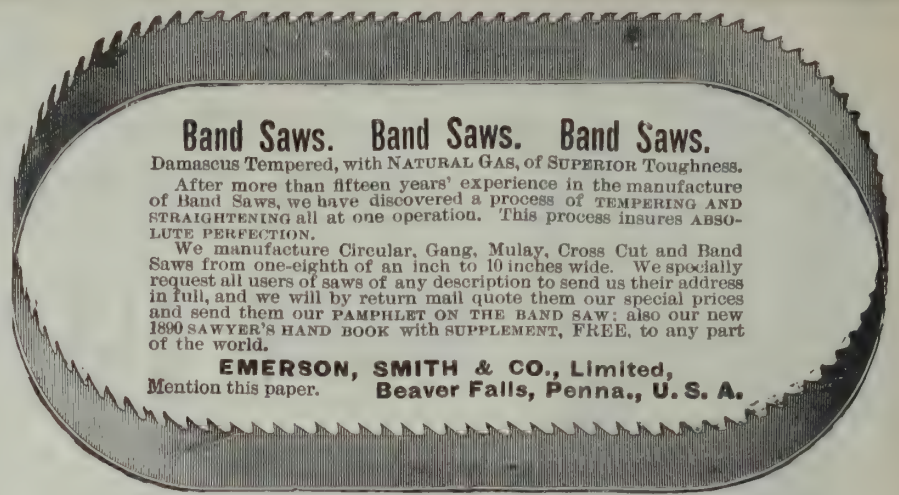
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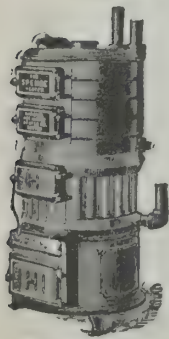


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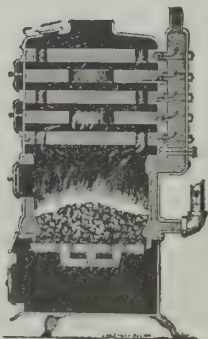
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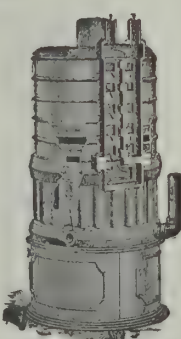
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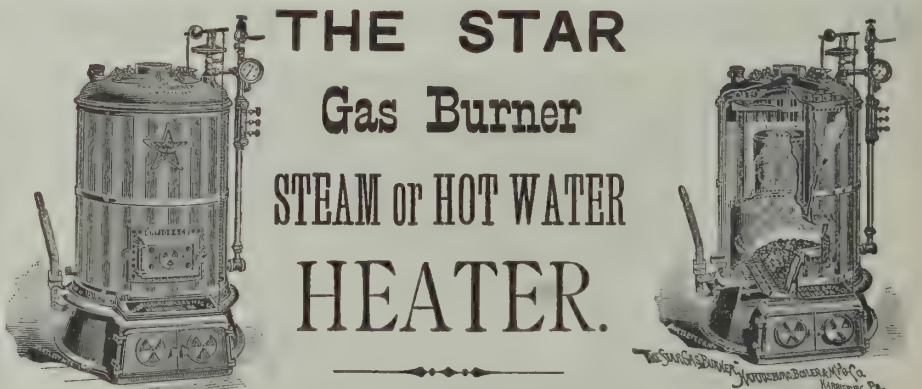


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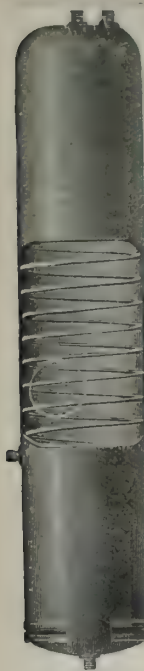
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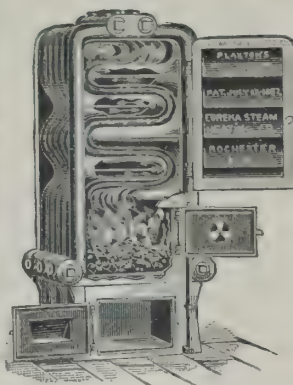
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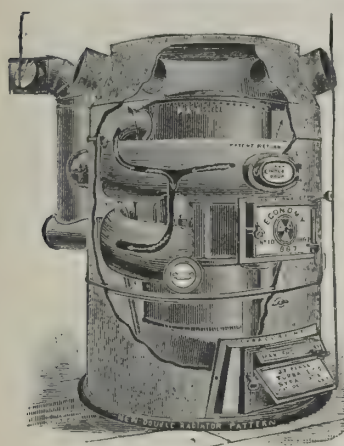
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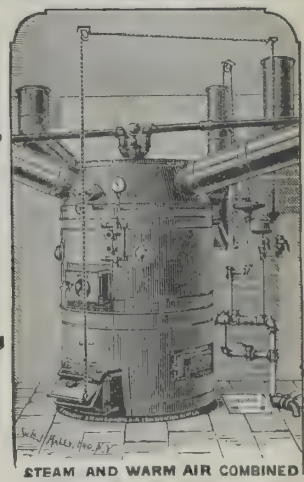
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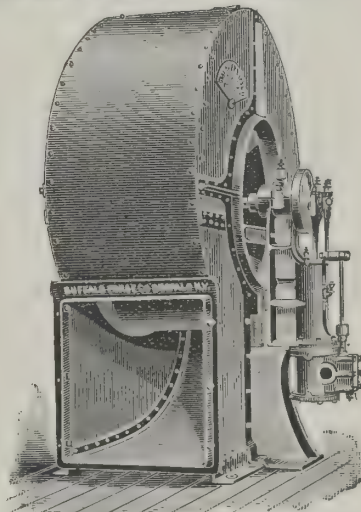
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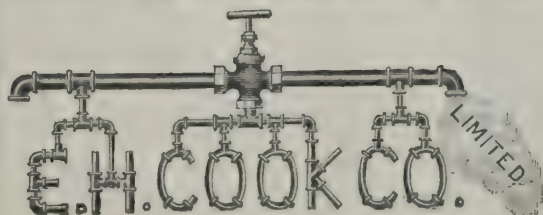
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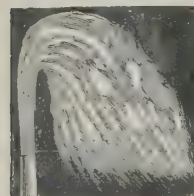
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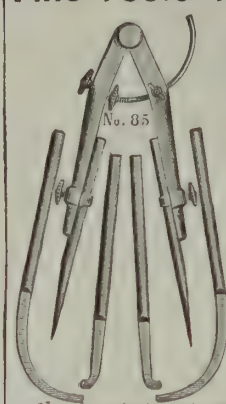
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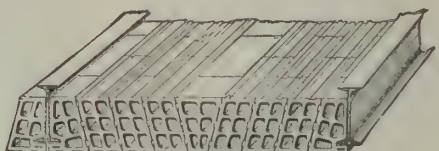
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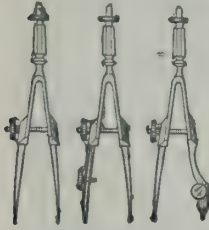
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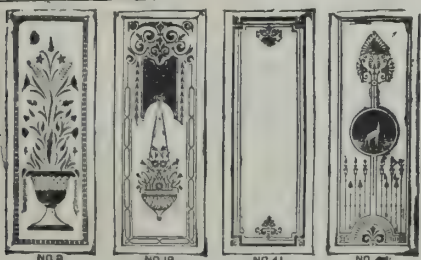
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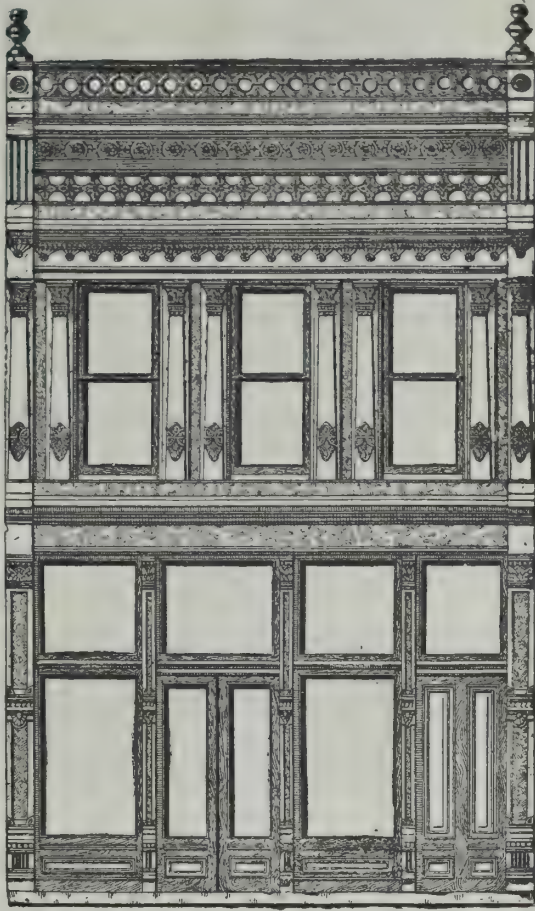
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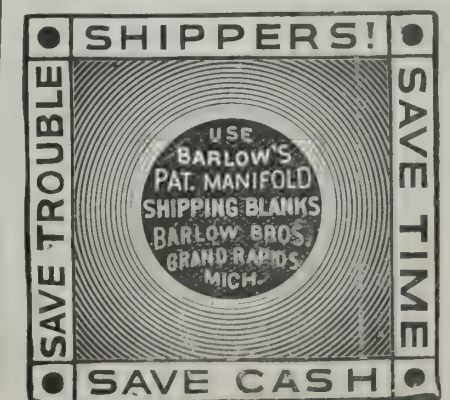
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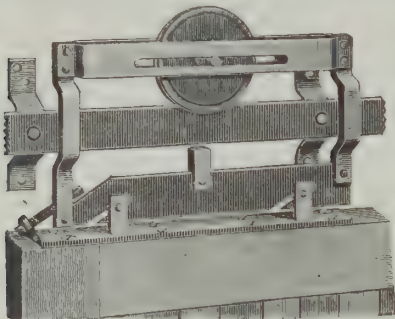
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### Notes and Queries.

(1) J. H. T. asks for the most correct method of ascertaining the contents of a barrel or cask, the diameter of the head, the diameter at bung, and the length being given. You will see in Haswell's "Engineers' and Mechanics' Pocket Book," of the issue of 1878, page 102, an example thus: Diameter of head 17 inches, bung 19 inches, length 28 inches; volume, 7,689 cubic inches. Now, by what rule is this answer arrived at? I have figured it various ways, but cannot bring the answer as above. A. Find the mean diameter of the barrel, and the number of square inches in this curve, multiplied by the height of barrel in inches, will give the cubical contents. Owing to the difference in the forms of barrels and the different curves of the staves, it is impossible to make one rule for finding the mean diameter apply in all cases. We think the figures quoted are a misprint, as they do not correspond with our calculation; they are changed in a later edition, which gives rules for four varieties of casks.

(2) B. T. H. says: I have a portable gas machine, gas made from heavy oil passing over red hot retort, in used since 1856. The pipes from retort to gasometer have become partly filled with a thick tar. Can you suggest anything to pour in which will dissolve this tar? A. There is no practical or safe way of dissolving the tar out of the retort connections. Take them down and scrape them out. There should be a hydraulic main and a washer between the retorts and the gas holder, which will gather the surplus tar on a water surface and save the pipes from clogging.

(3) J. C. M. says: I have a parlor fountain, in which the water mixed with air runs through about 30 feet of glass tubing, which gets very dirty, so we can't tell the difference between the bubbles of air or water (we use hydrant water). Can you inform me what to put in the water to clean the tubes and not hurt the zinc with which the tank is lined that feeds the fountain? A. Know of no better way than to take out the glass tubes and pour nitric acid through them. Fix the tubes so that the acids will run free. Make a little funnel of beeswax or paraffine around the top to enable you to pour the acid from a small bottle, catching it in a bottle at the bottom.

(4) H. G. V. asks: Is there any possibility of fire from steam pipes in a dry house for seasoning lumber, the pipes laid on wood? A. Many fires have been attributed to the contact of steam pipes with wood, but the pipes are never hot enough to cause a fire directly; steam pipes in contact with some soft woods, however, char them, and this charcoal, under certain conditions of limited supply of air, causes spontaneous combustion. 2. Is it necessary to have ventilation to increase the drying process? A. A little ventilation is best in a drying room for lumber. 3. What is the usual time for drying inch lumber at a temperature of 200 degrees, continuous day and night? A. It depends on kind and condition of the lumber; from two to four days.

(5) A. L. S. asks: Does it take more power to raise water out of a 160 ft. depth well with a 4 in. pipe than it does with an inch pipe, both pipes to have 2 in. cylinders at bottom of well? A. It takes less power by the difference in friction between the 4 in. pipe and the 1 in. pipe. With the small cylinder there

(Continued on page vi.)

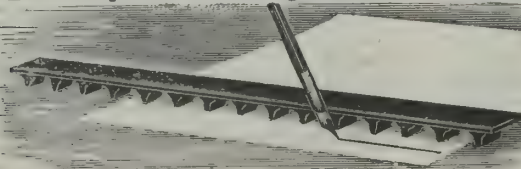
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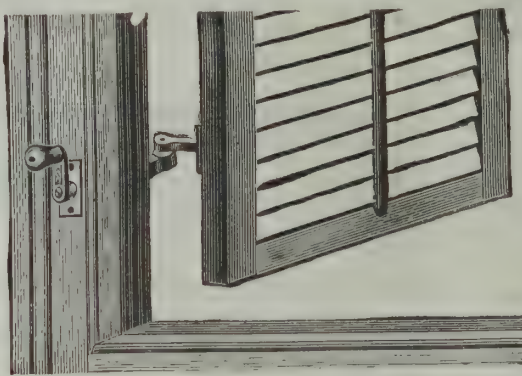
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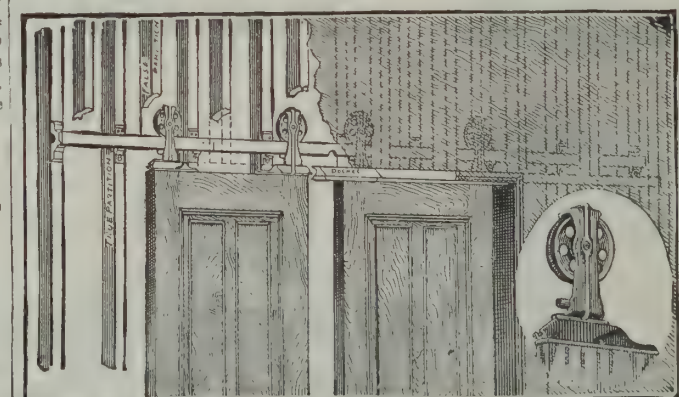
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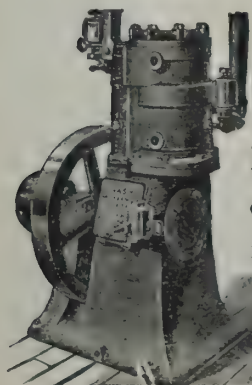
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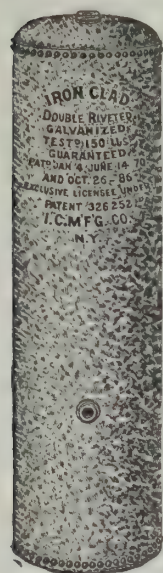
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(Continued from page iv.)

will be no perceptible difference with a slow movement, the static pressure being the same in both pipes.

(6) C. F. H. asks: What would be the cheapest and simplest plan to pump water into a tank, and if there is a hot air pump that is cheap and durable, also whether there is a windmill that lies down flat and can be covered with a roof? A. A hot air pump will probably be as cheap as and easier to manage than any other device except the windmill. We know of no windmills in the market that have a roof, or what are called horizontal mills. The best mills are those that stand square up to the breeze.

(7) H. P. T. asks: What is the cause of and remedy for discoloration of slate roof? The roof is something on the French style, topped out with a tin roof. Can it be rust or the paint used in painting the tin? It gives the slate an extremely bad appearance. Thinking it was iron rust, as the roof had been previously neglected, I tried acetic acid, etc., on the slate, but it had no apparent effect on it. A. Try oxalic acid 1 part, crystallized water 6 parts, by weight. Wash the slate with a swab and the acid, then wash with clean water. Oxalic acid is poison, and a powerful eradicator of stains.

(8) W. T. B. asks: How can the exhaust from a small steam engine be utilized for heating purposes? A. The exhaust of your engine can be entirely condensed and all its heat utilized by conveying the steam through iron pipes around your room or rooms, in the same manner that you would do for heating with live steam, only with this modification: keep the area of all the pipes combined and all the feed branches fully equal to if not larger than the area of the main exhaust. Put a back pressure valve in the main exhaust to turn the steam into the heating pipes, arrange all the coils so that the water of condensation will run naturally with the steam to the drips and the vent pipe at the further end of the circulation from the engine, from which point a generous vent pipe should be carried outside or to the roof.

(9) E. A. H. says: The inside walls to the basement of my house are rough brick, and dampness from the earth outside comes through. Is there anything I can put on the walls to prevent it? A. Rake out all the joints and clean the wall thoroughly; then plaster it carefully half an inch thick with a mortar made of Portland cement one part, sand one part. To be applied in a dry time, when no water is coming through the wall. The mortar is held up by the wall, and any considerable thickness of mortar tends to drag itself off by its own weight. The more the mortar is worked into the joints, the better. The cellar bottom may be covered with same material, but should be two inches thick.

(10) B. W. asks: Will a 4 inch pipe draw any more water out of a reservoir running down a hill 400 feet, than it will running down 33 1/3 feet, each having same head over mouth of pipe? A. We understand you to mean the head above the point of delivery; if this is correct, your 400 feet of pipe would deliver slightly less than pipe 33 1/3 feet.

(Continued on page vii.)

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SEND FOR  
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(Continued from page vi.)

(11) C. D. R. asks: Can I heat a room 60 x 20 ft., 9 ft. high, with steam from a 5 horse power boiler on the same floor, and in any way get the condensed steam back to feed boiler with? A. If your heating pipes are run above near the ceiling, and the boiler is 6 or 8 ft. lower, yes; otherwise you must trap the condensed water into a cistern or receiver and pump back to boiler.

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(13) J. S. K. asks: How is the cost of grading the bed of a railroad through an unbroken country easiest and best determined? The land is of a sandy soil, and quite level, with an occasional small swamp to cross. A. If you can run your road so that the cuts and fills will be equal to each other, the subject is very much simplified. The cost of excavating is computed at so much the cubic yard, the prices being affected by the quantity and quality of the material and the disposition of it. If there is not excavated material enough, the cost

(Continued on page xii.)

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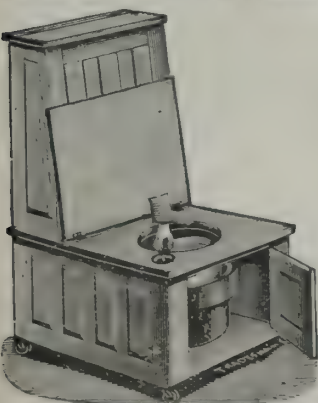
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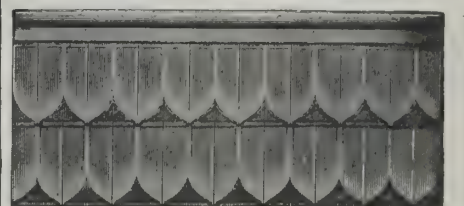
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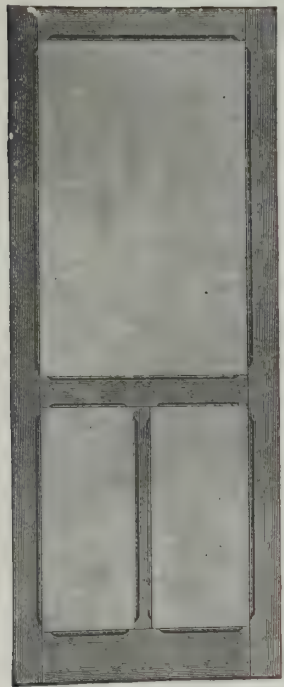
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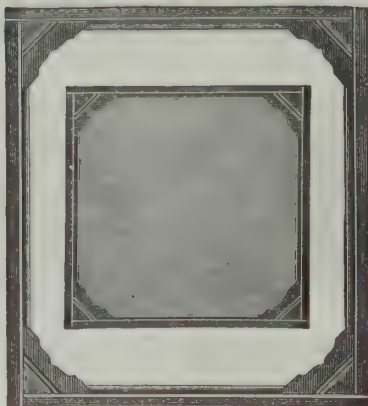




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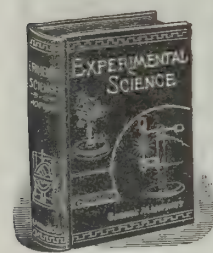
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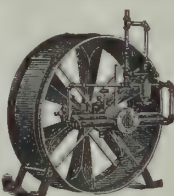
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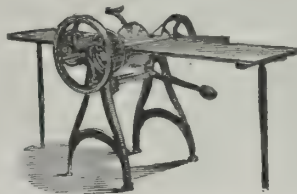
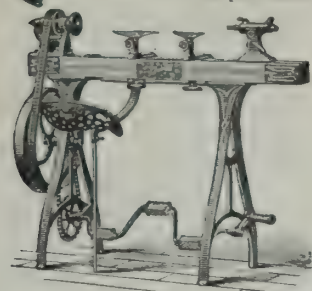


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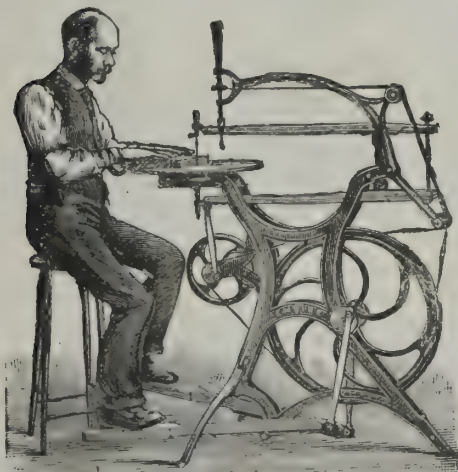
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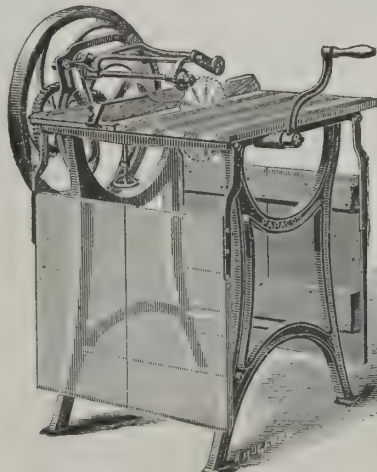
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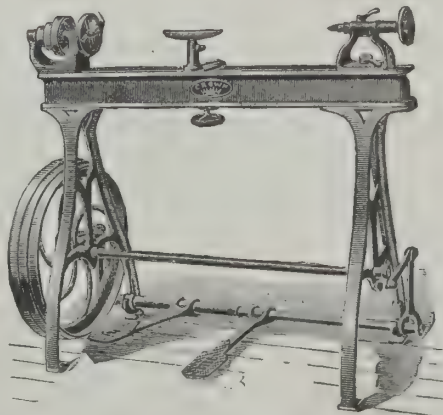
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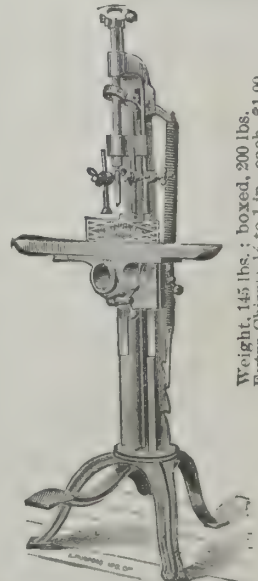
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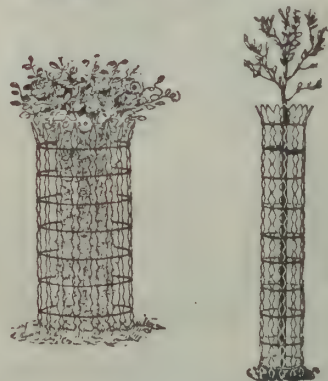
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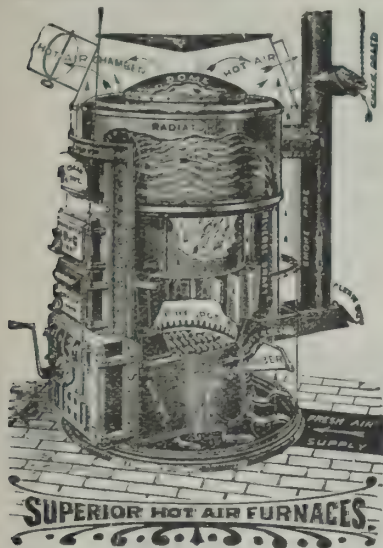
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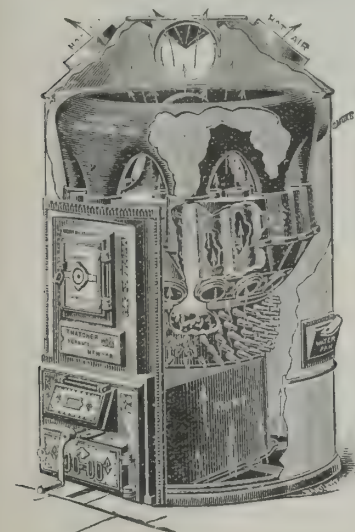
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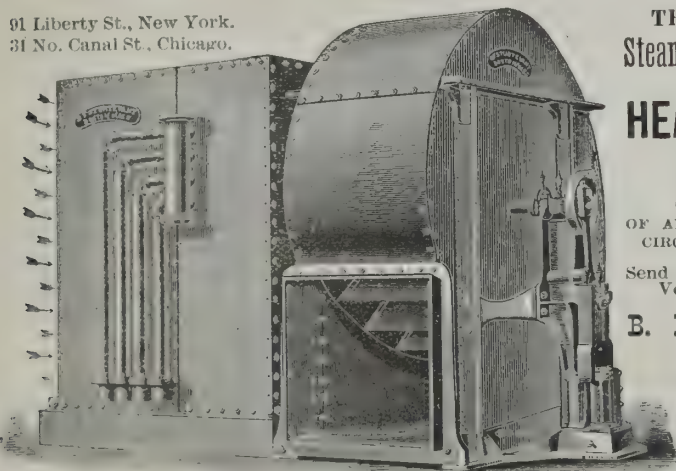
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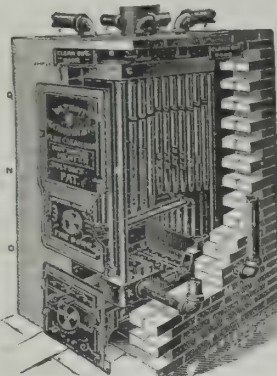
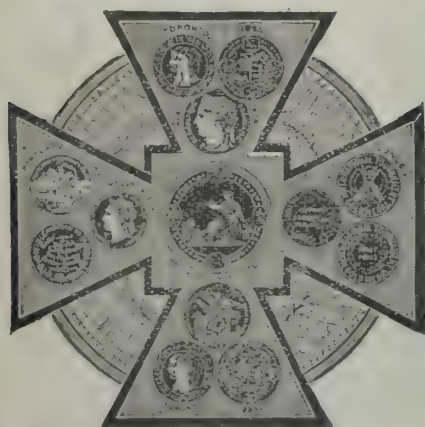
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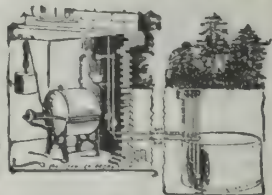
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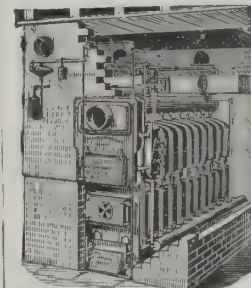
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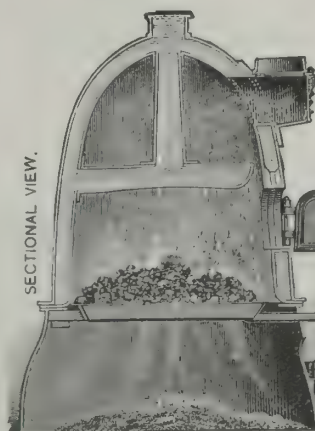


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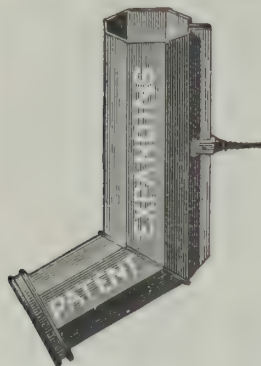
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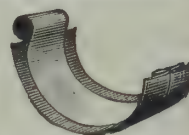
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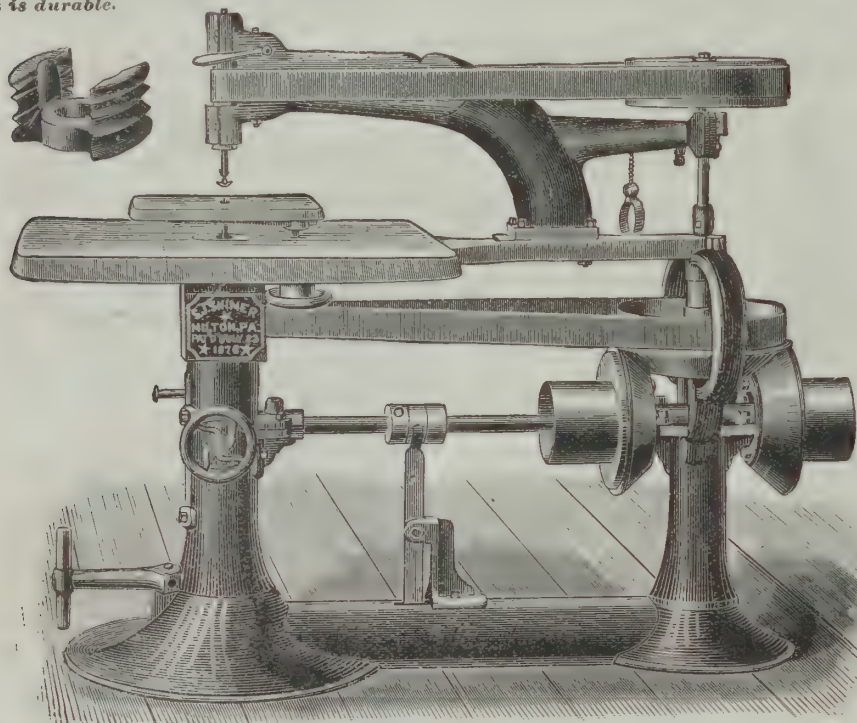


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**FOR SINKING** panels with pattern guided by pin that automatically takes its position when you start the Machine, and drops out of the way when you stop it. The Cutter in the overhanging arm of the Machine has a perpendicular adjustment of one inch, and is operated by the handle shown in the cut attached to an eccentric lever that is automatically locked to the one position when at work.

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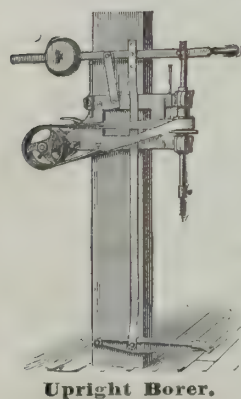
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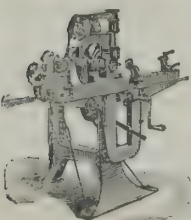
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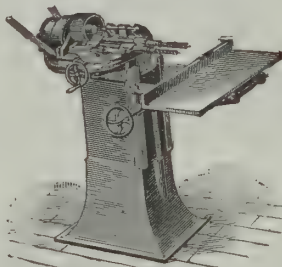
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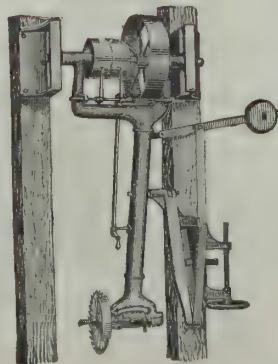


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(Continued from page vii.)

of filling is ascertained by the same method. If the swamp cannot be readily filled, you can compute the cost of piling at so much the pile or running foot. The cost of ballast, ties, and rails can be obtained upon any given length of road.

(14) A. M. B. writes: All old water-mill men insist that a saw runs faster and stronger, and will cut more lumber, at night than in the daytime. Is there any reason for this that can be accounted for scientifically? A. We never could appreciate that water was any heavier or that the machinery runs any lighter at night than by day. We think that the difference would perhaps be due to the change in the temperature, whereby there will be less friction of the parts.

(15) A. S. Co. asks whether the moisture could not all be taken out of a damp room heated at the bottom 150°, by ceiling the room with galvanized iron and having a steady stream of cold water flowing over the iron ceiling, and a system of troughs underneath to catch the drip? Would not such an arrangement create a circulation, and convey all the moisture out of a room quickly and thoroughly? A. Heating the air to 150° will largely increase its capacity to hold water; air at 75° that is moist becomes dry at 150°. Your ceiling will require to be much colder than the air before heating it, in order to condense any moisture. A cold room may be made moderately dry by condensing the moisture upon a colder surface and dripping the water into gutters leading out of the room with a siphon.

(16) H. W. asks for some formula for detecting arsenic in paper hangings, draperies, etc. A. If a sample of the paper or drapery is burned, it will, while burning, emit an odor of garlic if it contains arsenic in quantity. Other tests should be executed by a chemist.

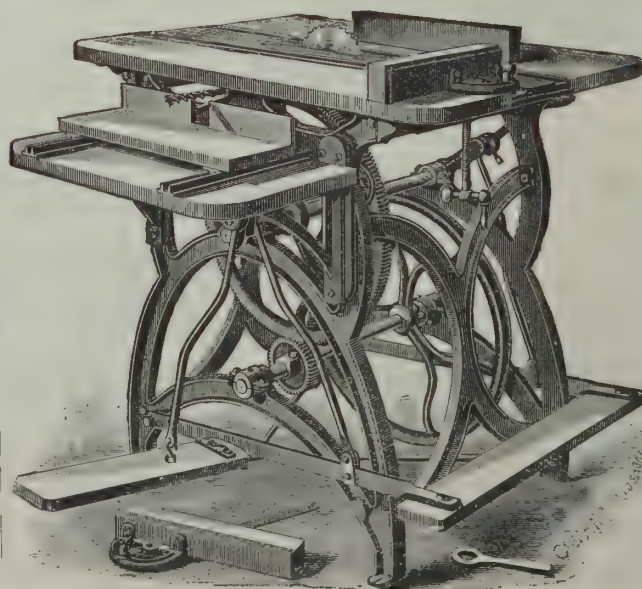
(17) W. M. H. asks for a receipt for the liquid used to ebonize wood, and how to apply it? A. One gallon of vinegar, one-half pound of green copras, one-quarter pound of China blue, two ounces

nut galls, two pounds of extract of logwood. Boil over a slow fire, then add a pint of iron rust. Wash the wood with this. 2. Also, the receipt used by instrument makers for staining or lacquering brass that dark green seen on surveying instruments? A. Dissolve shellac in alcohol, strain, and add turmeric or gamboge in sufficient quantity to produce the desired shade.

(18) W. L. S. asks how a circular opening three inches in diameter may be made in the center of a plate of glass ten by ten. A. With a good diamond make a circular cut in the glass of the diameter of the hole, then within it make a number of circular cuts. By dexterously hammering the glass at the center of the circle, the break may be started. After this the removal of the remainder is comparatively easy.

(19) J. B. V. asks (1) how to make blue print paper. What are the formulæ used? A. See our SUPPLEMENT, Nos. 585, 741, 514, 584, and 714. 2. Can dextrine be made from starch with the use of water alone? If so, how, or how can it be made without diastase? A. No. Starch is boiled with a weak acid. 3. How may a bottle be cut off near the bottom without injuring the rest of the bottle? A. File a notch, start a crack with a red hot poker, and lead it around. 4. What is the formula for the liquid used in mixing gold paint, bronze, gilding, etc.? A. Use copal varnish or lineeed oil and liquid drier. 5. Can you give me a formula for a mullilage that I can stick paper to tin with? A. Use gum tragacanth. Also see SCIENTIFIC AMERICAN, No. 15, vol. 63.

(20) A. M. Radius asks: How may I obtain a mould or template where a radius of 50 ft. or over is required? I have no room to strike above radius, besides I could not obtain it accurate enough. A. We do not know of a more practicable or accurate method of obtaining a radius mould than to hang a small steel wire of the given length or steel tape down the wall of a building and fasten the board or plate to the wall at the proper place and swing the pencil or point fastened to the wire. Any system of computation is uncertain and tedious.



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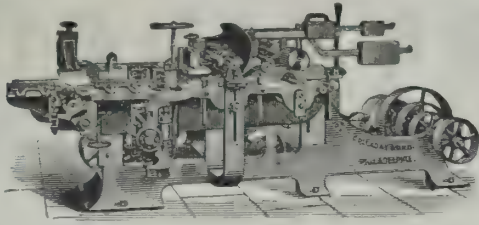


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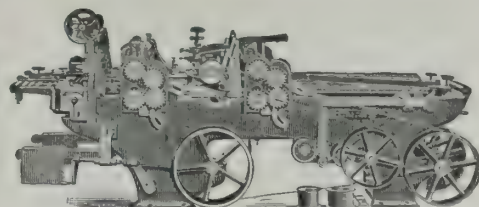
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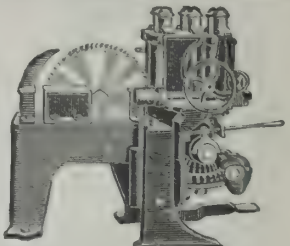
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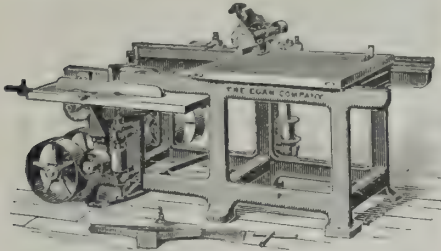


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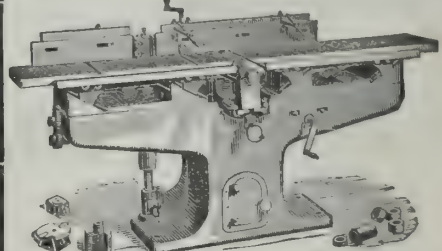
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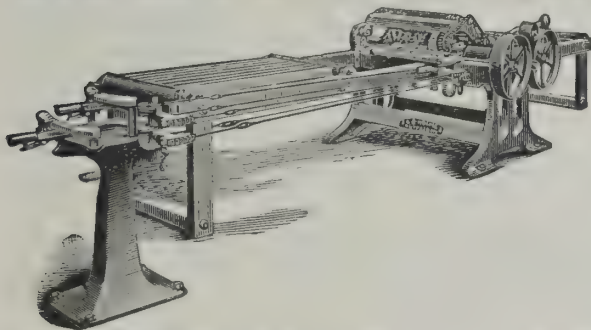
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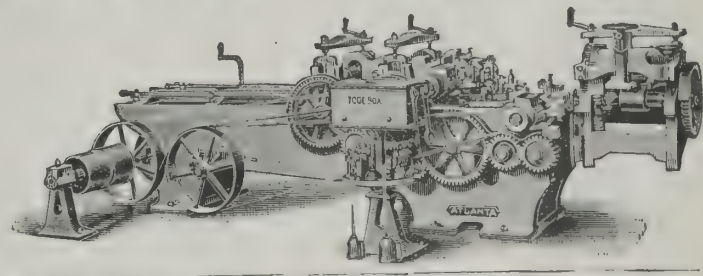
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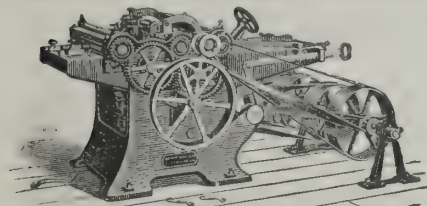


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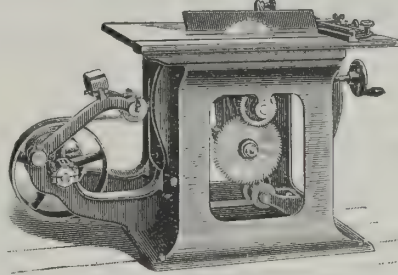
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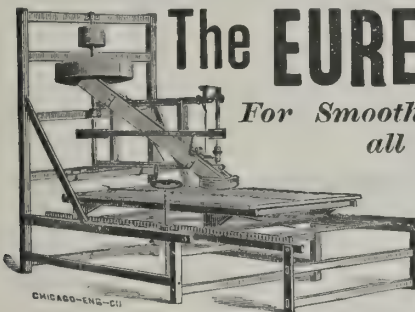
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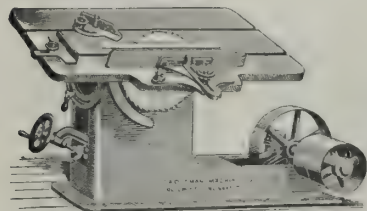


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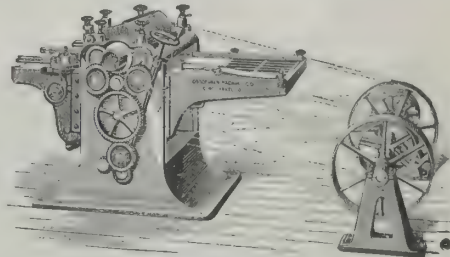
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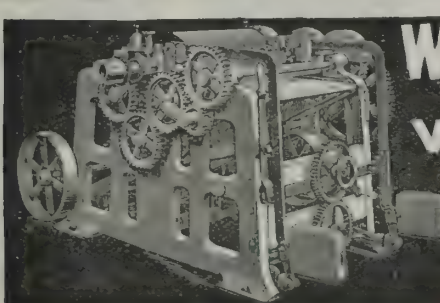
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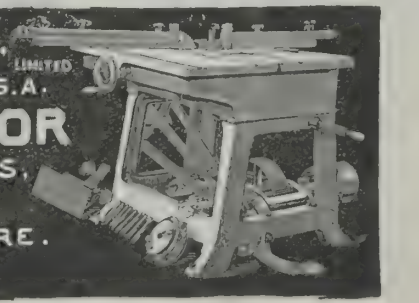
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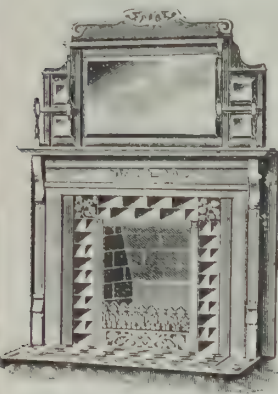
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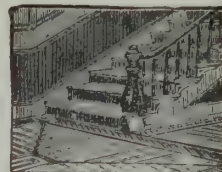
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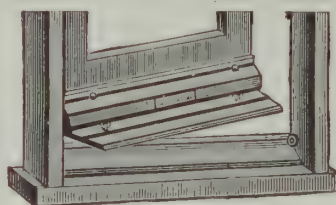
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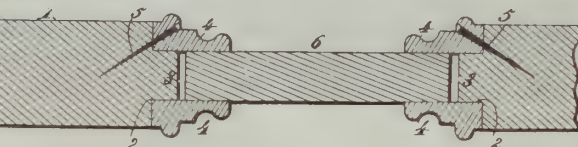
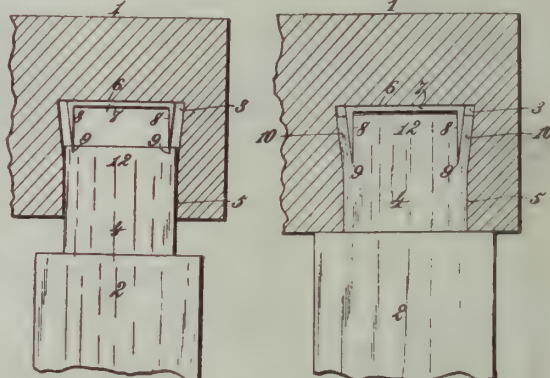
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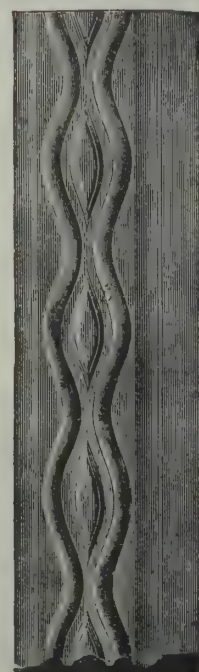
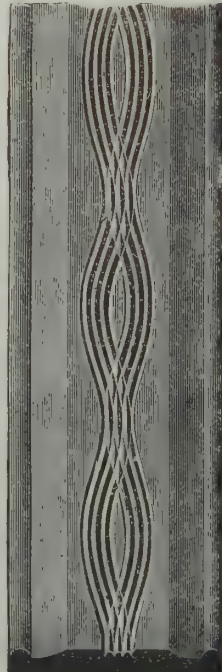
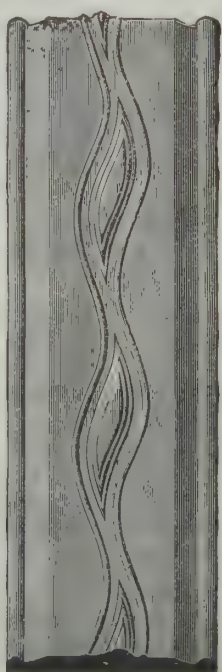
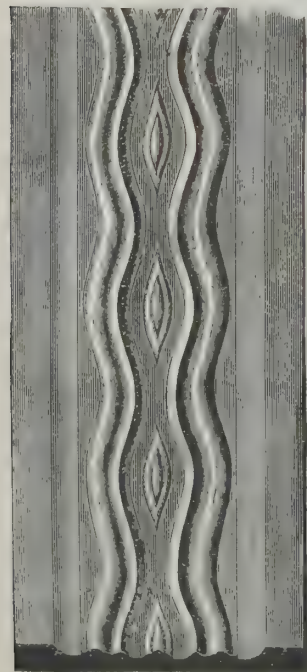
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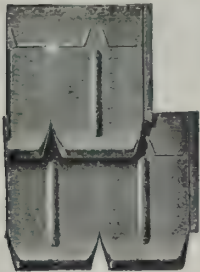
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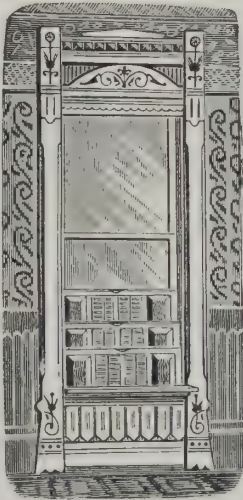
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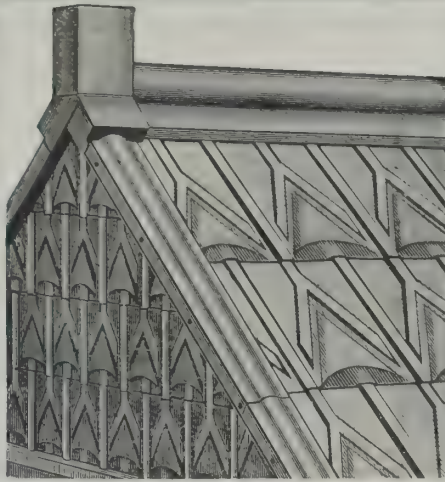
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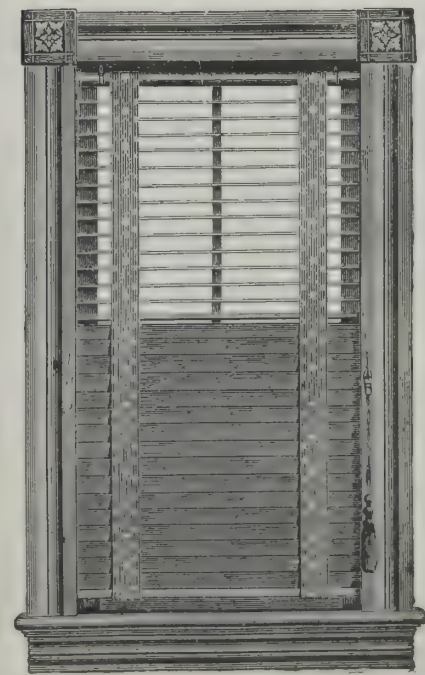
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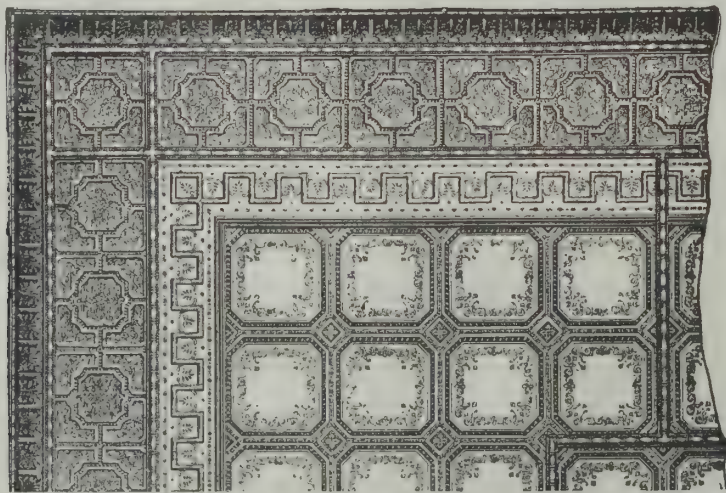
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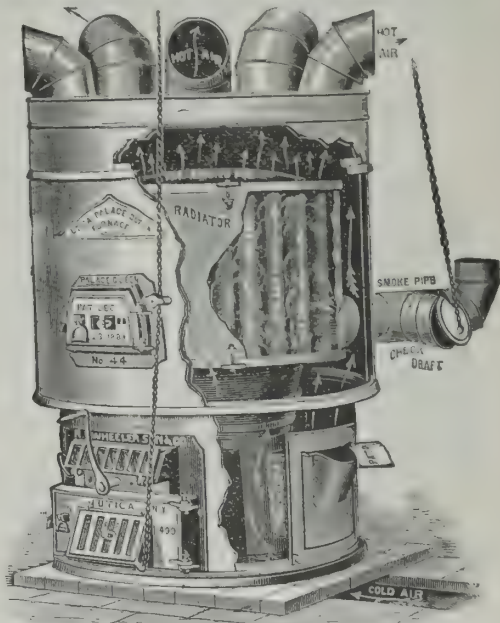
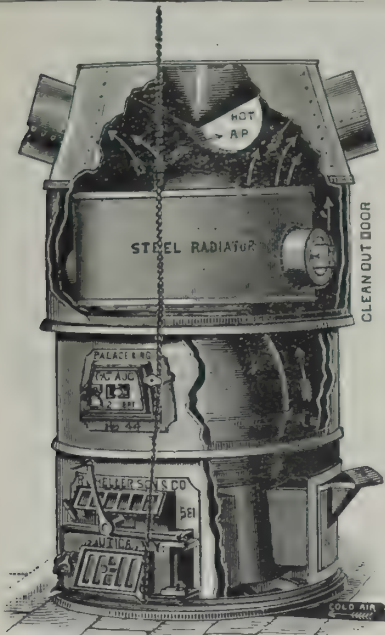


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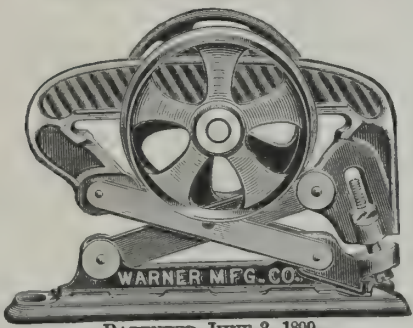
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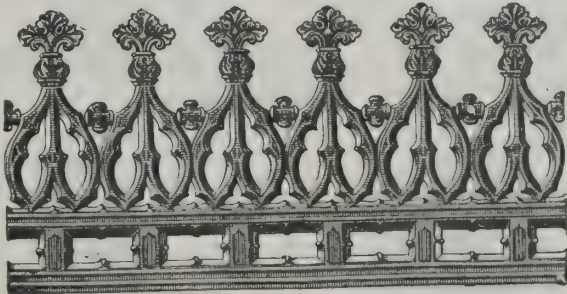
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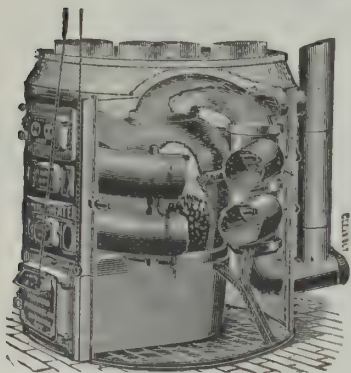




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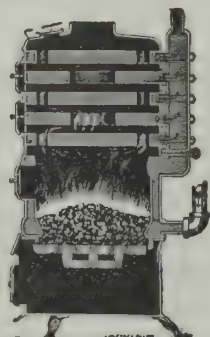
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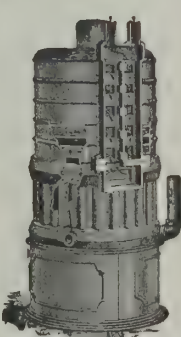
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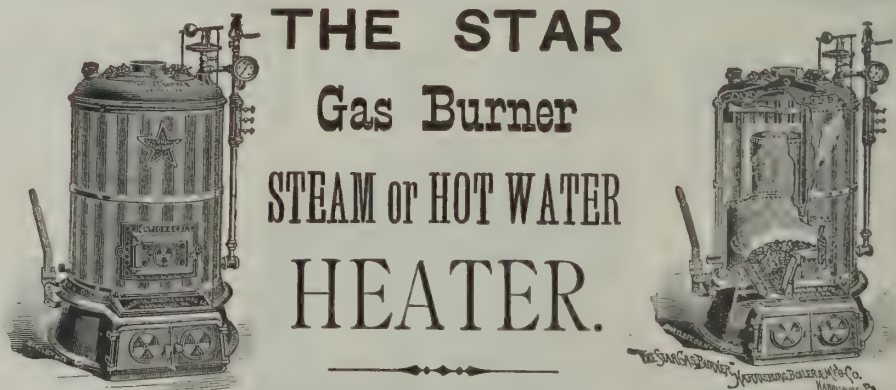
Note complete arrangement of flues.



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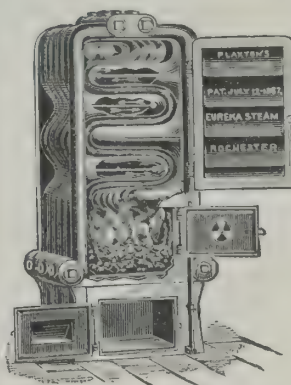
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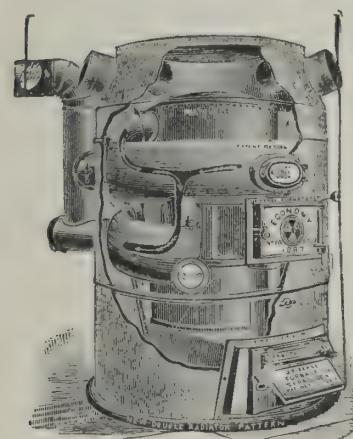
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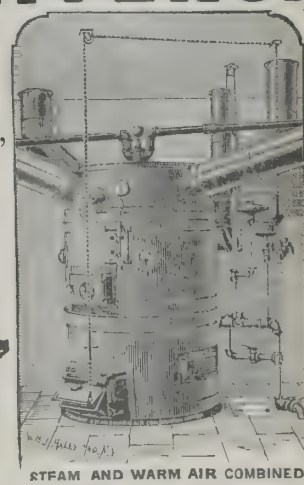
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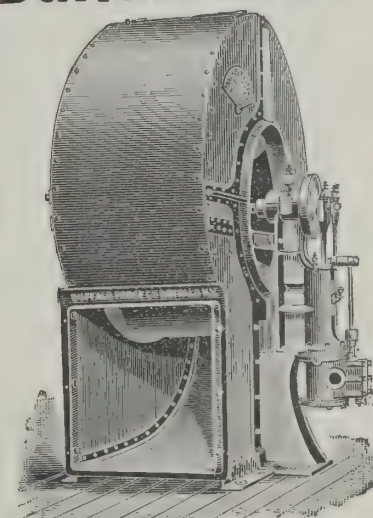
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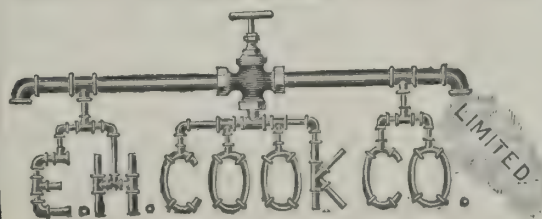
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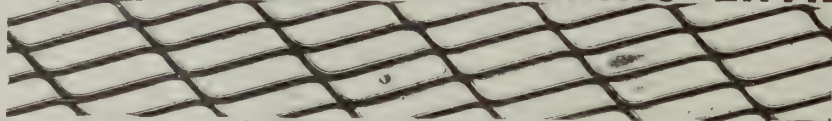
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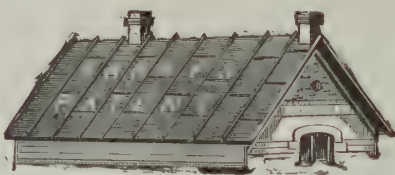
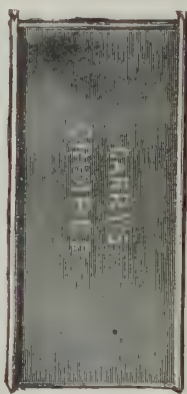
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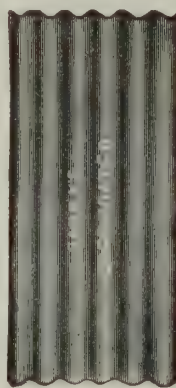
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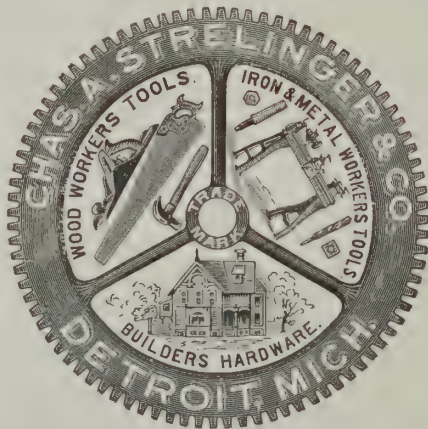
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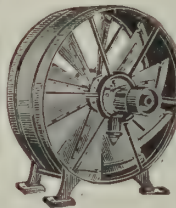
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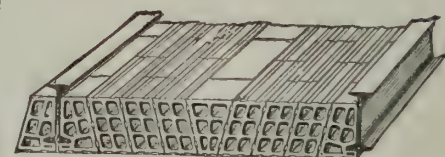
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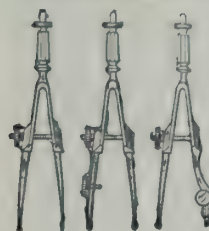




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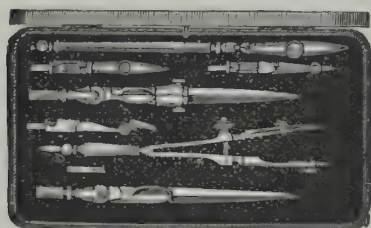
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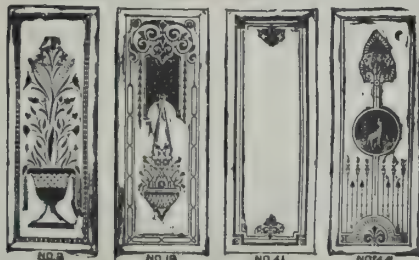
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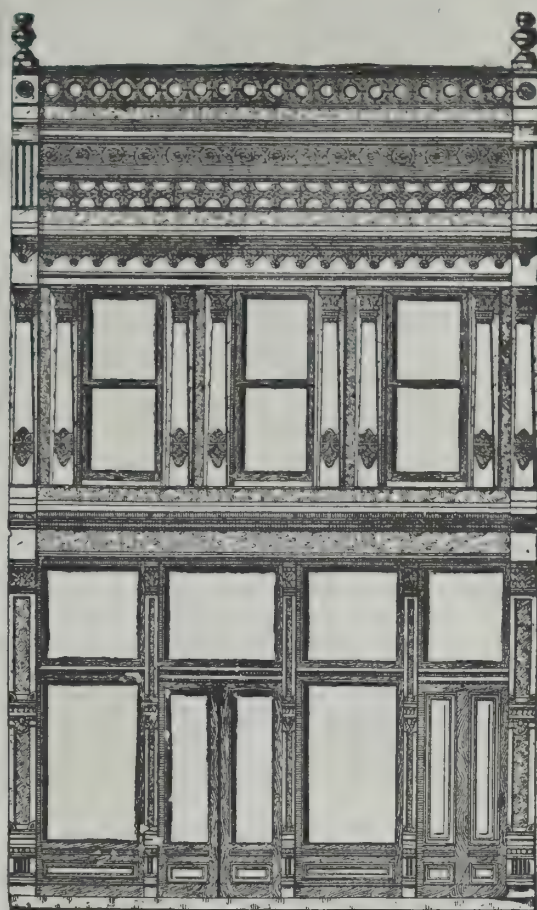
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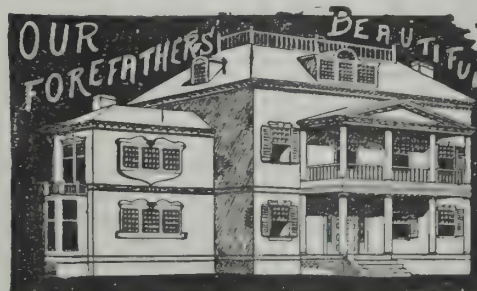
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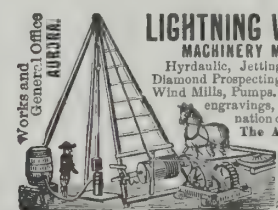
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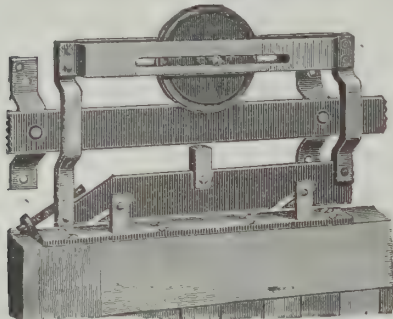
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### Notes and Queries.

- (1) H. K. G. asks: 1. What is the composition of the cement used to repair rubbers? A.  
a. Masticated caoutchouc..... 10 parts.  
Chloroform..... 280 "  
b. Masticated caoutchouc..... 10 "  
Resin..... 4 "  
Venice turpentine..... 2 "  
Oil of turpentine..... 40 "

Melt the cut-up caoutchouc and resin together before solution b, add the Venice turpentine and then dissolve. Mix both solutions. Dip a piece of cloth in the solution and apply to surface, previously brushed over with cement. 2. Please give also a receipt for a leather cement. A. Bisulphide of carbon solution of gutta percha. See "Rubber Hand Stamps and the Manipulation of India Rubber," \$1 by mail.

(2) G. M. P. asks for receipts (1) for cleaning and polishing marble such as marble top stand tables, bureau tops, etc. A. Brush off the marble and apply following:  $\frac{1}{4}$  pound whiting,  $\frac{1}{4}$  pound soft soap, 1 ounce washing soda, a piece of blue vitriol the size of a walnut. Rub over the marble and let it stand 24 hours, then wash off and polish with a piece of flannel. To remove stains use a mixture of 1 ounce ox gall, 1 gill of lye,  $\frac{1}{4}$  tablespoonfuls of turpentine, made into a paste with pipe clay. Apply as above. For oil stains use perfectly dry clay saturated with benzine, and applied over the spot and allowed to stay for some time. 2. For cleaning and polishing furniture. A. Dissolve 4 ounces best shellac in 2 pints 95 per cent alcohol, add 2 pints linseed oil, 1 pint turpentine, mix and add 4 ounces ether and 4 ounces ammonia, mix, shake before applying. Use a sponge. 3. For cleaning and polishing ivory, such as piano keys, etc. A. For piano keys use the finest crocus or whiting. You cannot whiten them except by special treatment, such as exposure under turpentine to the sun's rays. 4. For taking all kinds of stains, etc., out of fine clothing. A. Use benzine. Apply in a circle around the spot, and work into the center and sponge off.

(3) A. S. C. asks: Is there any paint or any material with which I can paint an inside plastered wall to keep out moisture or dampness? The plastering is done on rock, and I think the moisture is mostly from perspiration. I wish to paper the wall. A. You might coat it with silicate of potash or soda, which would result in a very hard surface, or two or three good coats of zinc ground in linseed oil would do. But we think your best plan would be to have a wall within a wall, one of which would receive the perspiration and permit it to drip and run off, and the other could take the paper hanging.

(4) P. H. M. writes: 1. I want to heat a building 40 x 25 feet by the exhaust from engine; want to run pipe along both sides and across one end. Can I do it without too much back pressure on the piston? A. Yes, have your pipe of ample size and fitted with a back pressure valve (safety valve) which you can load to such back pressure as you wish. 2. Please give rule for finding horse power of high pressure engines? A. See rule in SCIENTIFIC AMERICAN SUPPLEMENT, No. 253. 3. Where can I get a paper that treats mostly on steam engineering? There is no periodical published in this country specially devoted to steam engineering. For books on this subject see advertising columns.  
(Continued on page vi.)

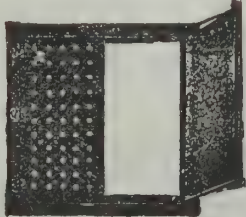
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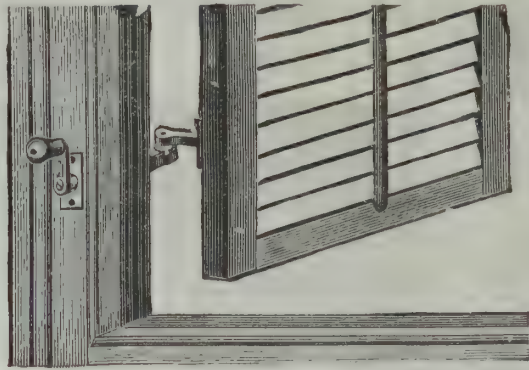


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AMERICAN SUPPLEMENT, No. 746. Price 10 cents.  
To be had at this office and from all newsdealers.

(Continued from page iv.)

(5) C. W. asks: What filler should I use for pine wood, which is stained before varnishing; also a good filler for hard woods, as ash? Can it be bought prepared, if so, what should be asked for? What is the process to give cherry the beautiful red finish? Is it in the varnishing, if so, what varnish should be used? A. For filling use whiting, 6 oz.; Japan, ½ pint; boiled linseed oil, ¼ pint; turpentine, ½ pint; corn starch, 1 oz. Mix well together, and apply to the wood. On walnut wood add a little burnt umber, on cherry a little Venetian red, to the above mixture. In the SCIENTIFIC AMERICAN for May 28, 1881, is an excellent receipt for a filler for hard woods. Consult our advertising columns for addresses of makers of wood fillers.

(6) H. S.—Creosoting, or treating wood with creosote, is considered the most satisfactory means of counteracting the influence of the teredo in timbers located in the water.

(7) S. S. W.—Your inquiry has already been answered in the SCIENTIFIC AMERICAN, but, in addition to the reply then given, we would say that a common method of removing paint and varnish from wood is to soften it by means of a flame gas (or alcohol), or by means of a hot iron held near, but not in contact with, the wood. When the paint is thus softened, it may be readily removed from the surface of the wood by means of a broad, thin scraper.

(8) L. C. M. writes: I wish to ebonize some maple by boiling it in a dye, so as to have it penetrate into the wood. I can dye the pieces, but cannot season them after taking them out of the dye without nearly all of them becoming checked. The wood is kiln dried before it is put into the dye, and stays in the dye about twenty-four hours. Does immersing wood in a solution of caustic soda have any tendency to toughen it? A. Your difficulty is probably due to some lack of proper manipulation, which could only be detected by seeing you work. The following, if properly conducted, might give satisfactory results: Into a quart of boiling water put 1½ ounces of copperas and 2 ounces of logwood chips. Lay on hot; when dry, wet the surface again with a solution of 2 ounces of steel filings dissolved in half a pint of vinegar. When dry, sandpaper down the grain and get a smooth face, and as the work to be ebonized must be quite free from holes, oil, and fill in any of these with powdered drop black mixed in a filler. Then give a coat of quick drying varnish (made by dissolving black wax in spirits of wine).

(Continued on page vii.)

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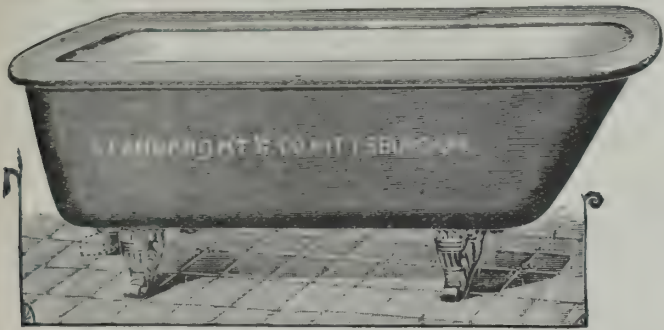
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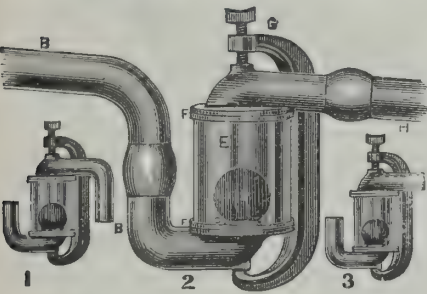
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Send for Catalogue E.

(Continued from page vi.)

and finish the work by rubbing down with finely pulverized pumice stone and linseed oil until a good surface is acquired. We fail to understand how any advantage can be gained by using caustic soda.

(9) W. W. E. asks (1) the rule to find what quantity of water will flow through a pipe when you have the size of pipe, length of pipe, and fall given. A. The result is affected by the character of the pipe (material) and joints. Rule given in Haswell's Pocket Book, page 385 :

$39.27 \sqrt{\frac{h d^5}{l}}$  = volume of discharge in cubic feet per second, in which  $h$  = head in feet,  $d$  = diameter in feet, and  $l$  = length in feet, in this case,

$$39.27 \times \sqrt{\frac{50 \times 0.166^5}{200}}$$

2. I would like the rule for finding the pressure, friction, velocity, and quantity of water delivered, when you have all the above points to compute by. A. The pressure is, 0.4335 pound per square inch for each foot of head. In Haswell's Pocket Book you find the rules of hydraulics fully treated, also in Trautwine's Engineer's Pocket Book.

(10) F. H. B. asks the best way to case-harden gas pipe, the diameter of pipe 6 in. and 4 in., corrugated on the outside with 18 or 20 corrugations per inch, about three thirty-seconds of an inch deep. I wish to know the most thorough manner, regardless of cost. A. All casehardening is superficial, as its name implies. The best method of casehardening is packing the article to be treated in a tight box of iron with ground bone, prussiate of potash, and charcoal, and heat for several hours to a red heat. Then plunge into water. The longer the exposure to the heat, the deeper the coating.

(11) A. C. F. asks about a driven well where the soil is sandy, water being found about 60 feet below the surface; it appears to be in the quicksand, beneath which appears to be clay. In getting water, the sand being fine and mixed with the water, passes through the pipe, and is continually drawn up with the water, thus making the water muddy and impure. How can a well be driven under such circumstances so as to make it work well? A. There is no better way of keeping fine sand out of driven well pipes than to make the strainer longer than usual and cover with very fine brass wire cloth, about 60 mesh to the inch. When driven into quicksand, the fine sand that will pass through may be pumped up by working a pump strongly. The larger particles of sand will be drawn against the strainer, and in a short time form a filter stratum around the pipe, which will keep back the quicksand. In this way we have pumped out a half barrel of the fine quicksand, and obtained a clear flow that lasted many years. Sometimes doubling the wire cloth will add much to the durability of the strainer.

(Continued on page xii.)



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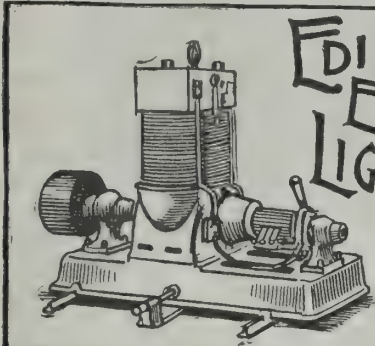
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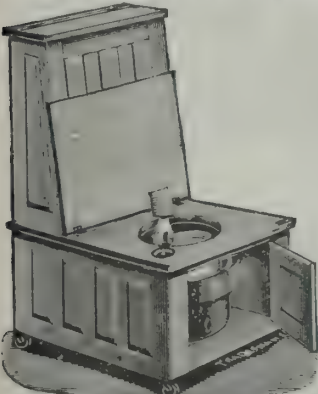


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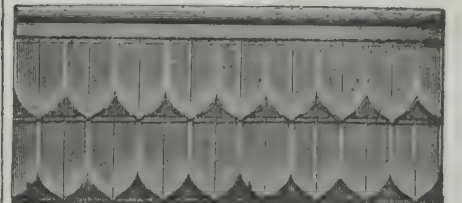
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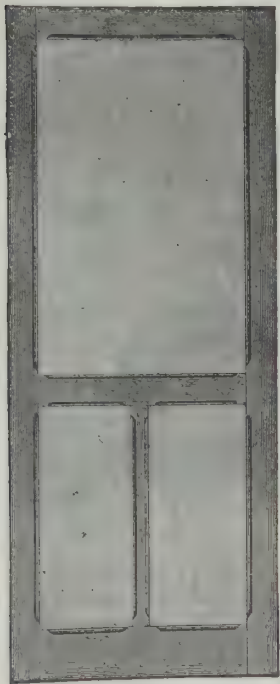
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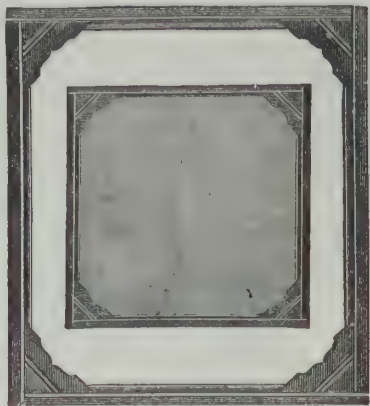
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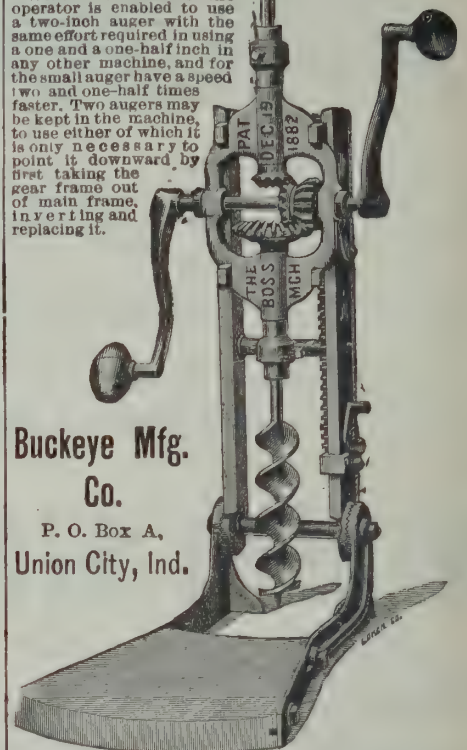
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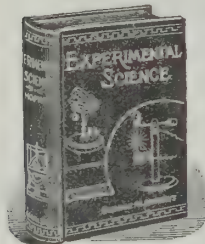
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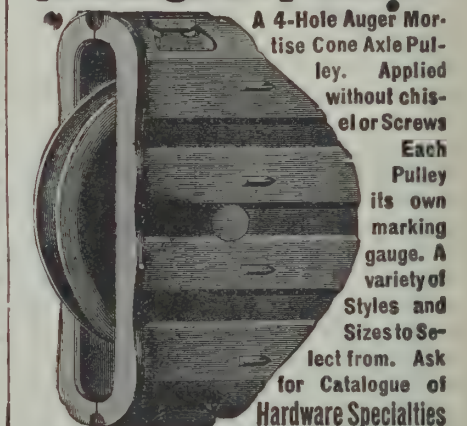
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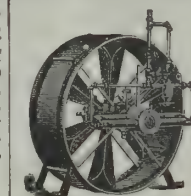
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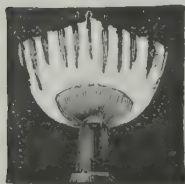
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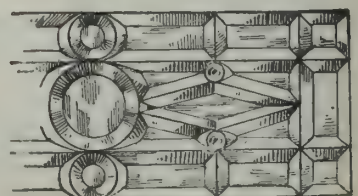
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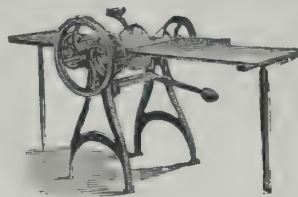
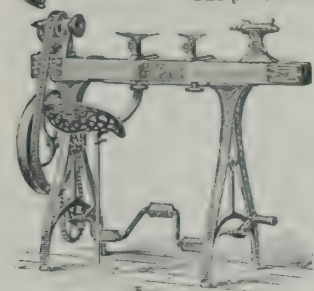


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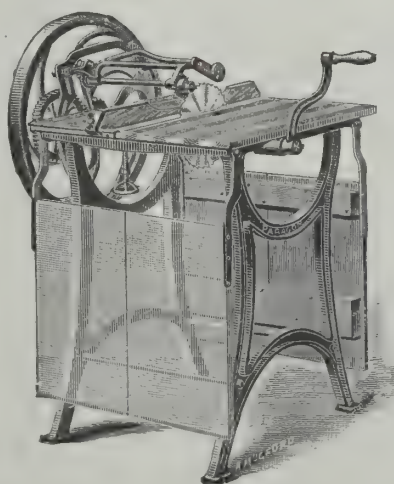


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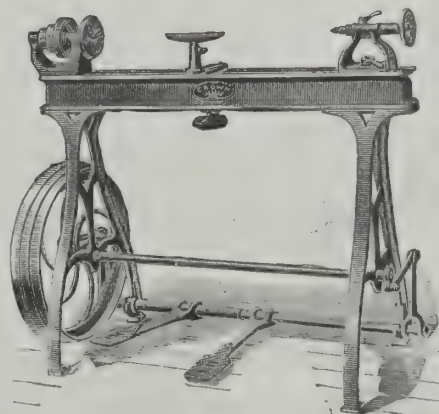
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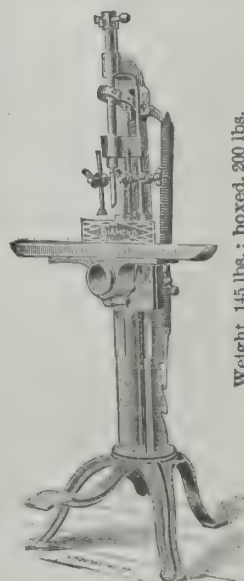


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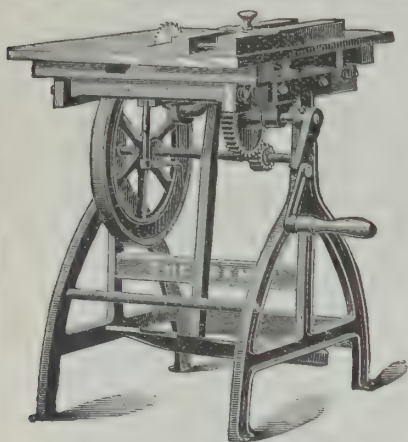
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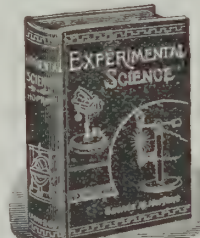
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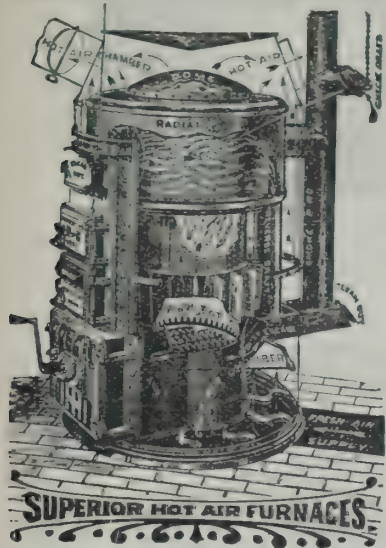
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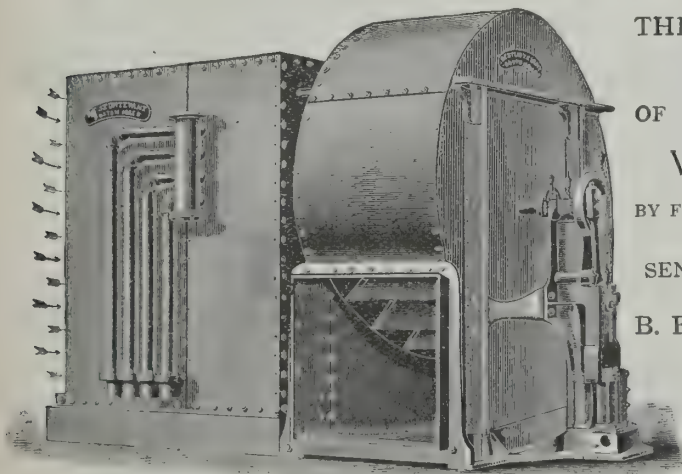
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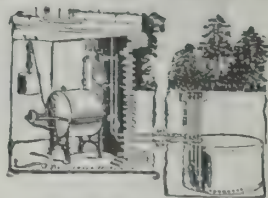
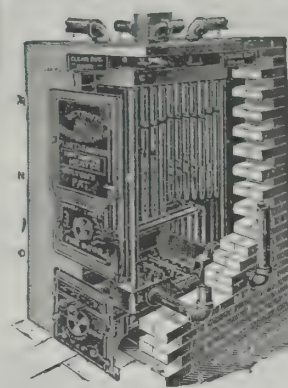
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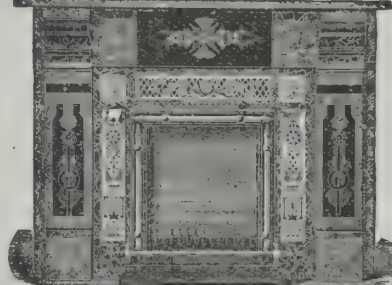


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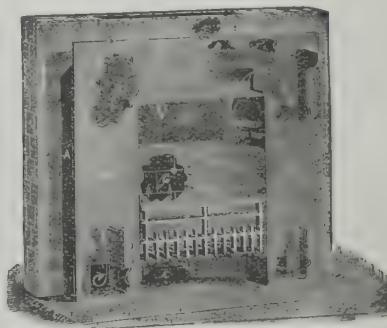
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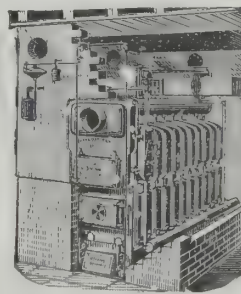
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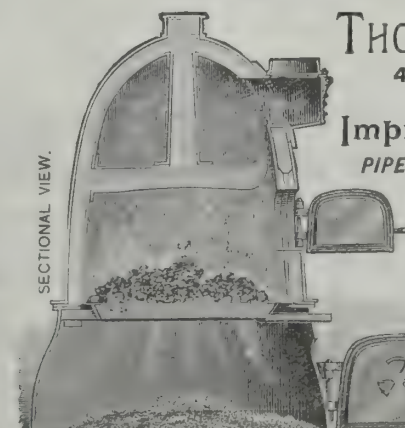
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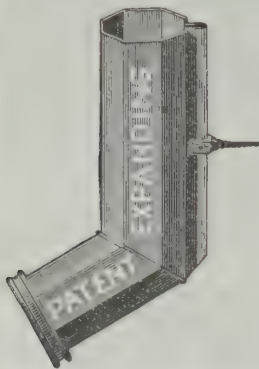
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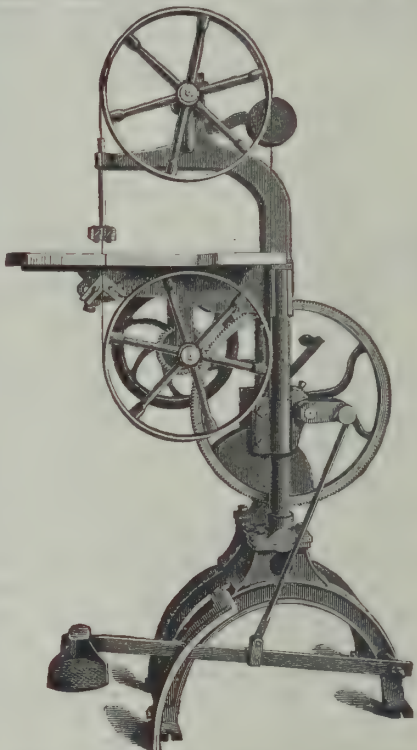


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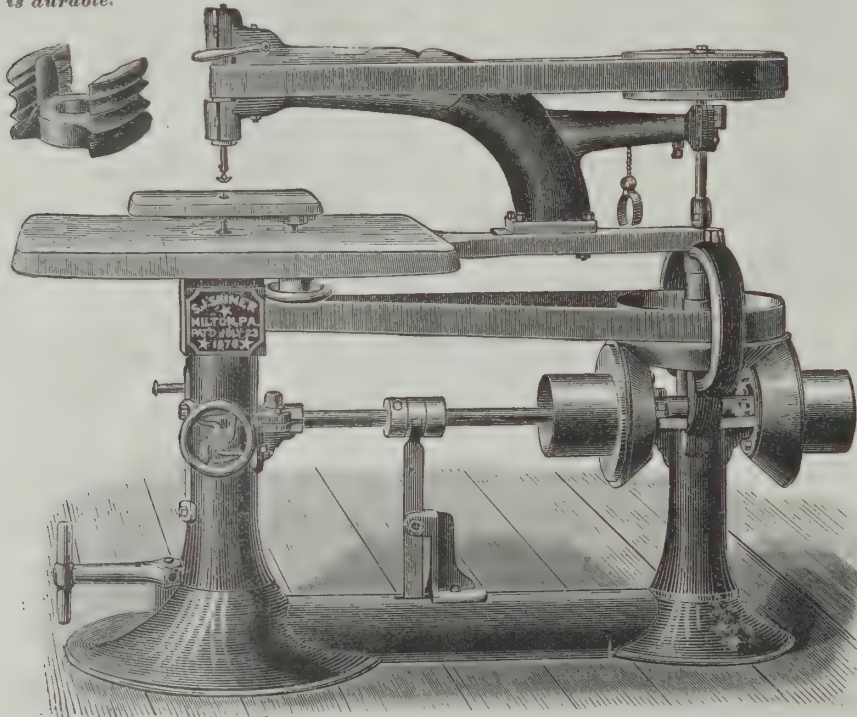
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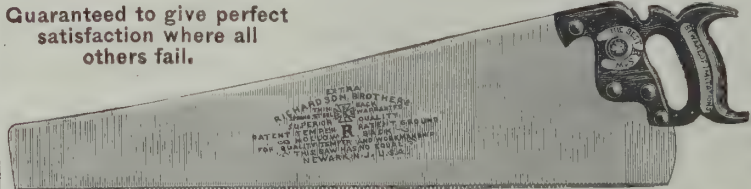
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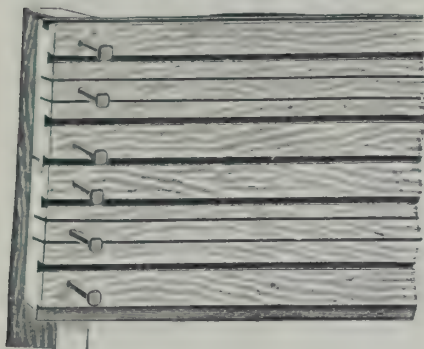
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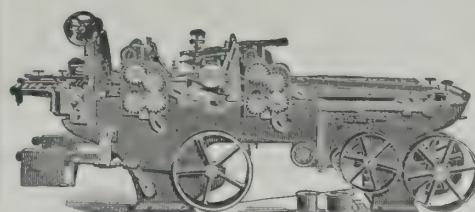
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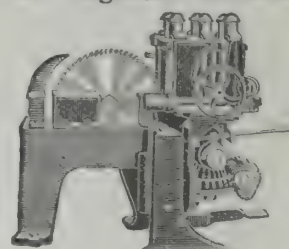
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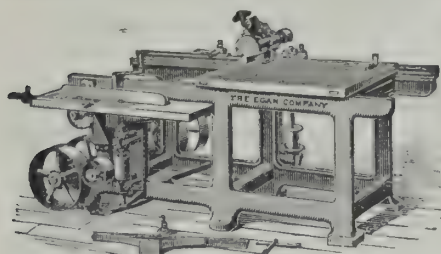


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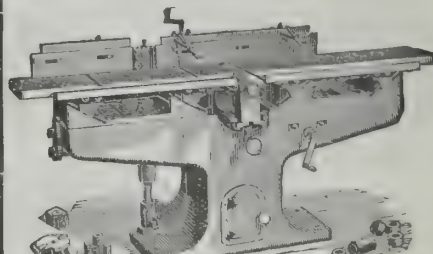
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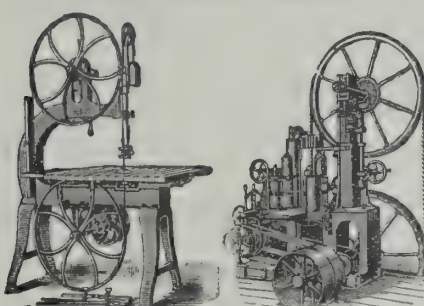
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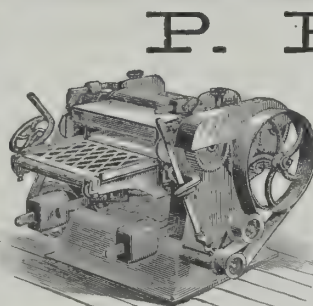
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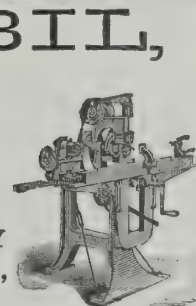
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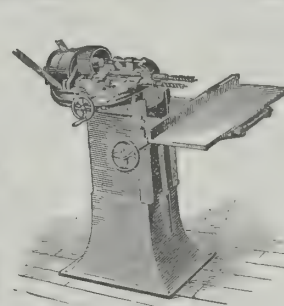
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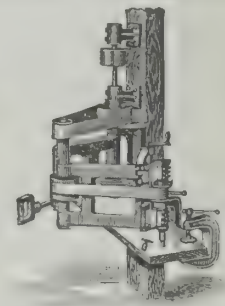
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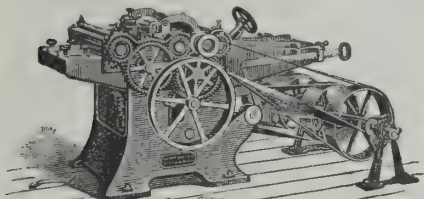
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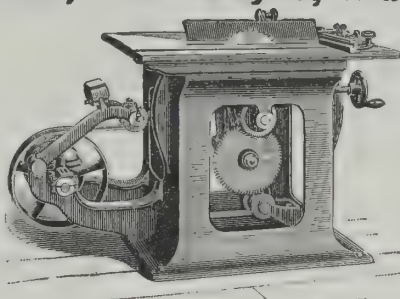
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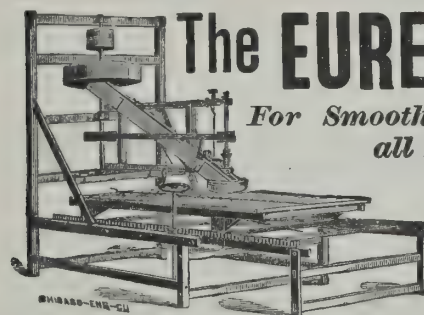
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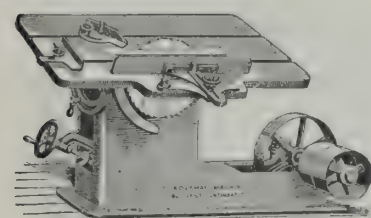
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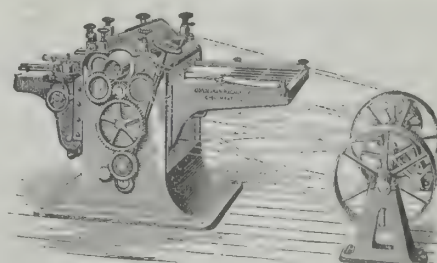
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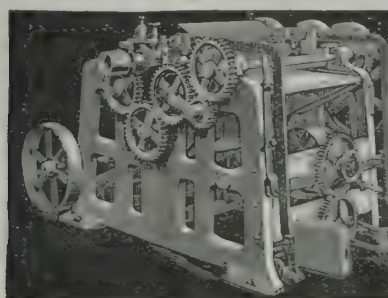
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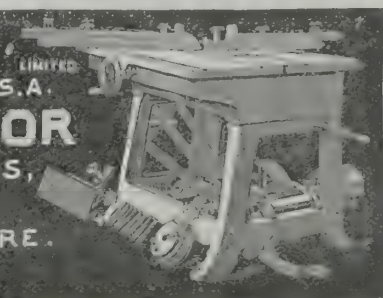
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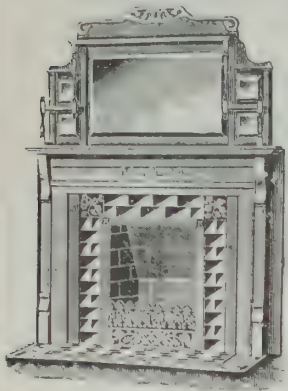
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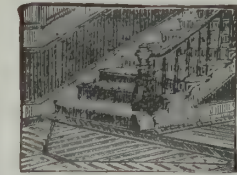
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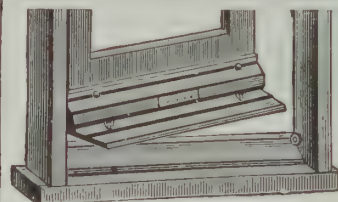
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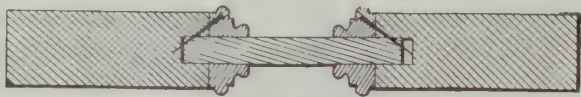
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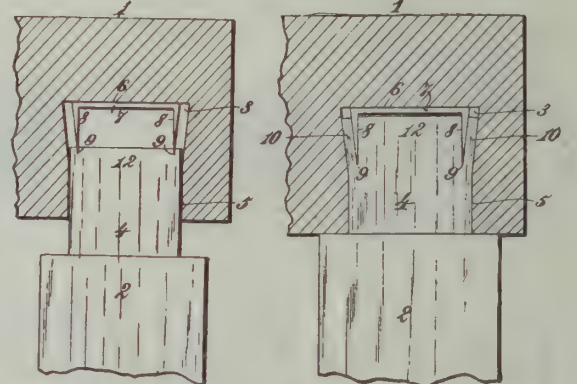
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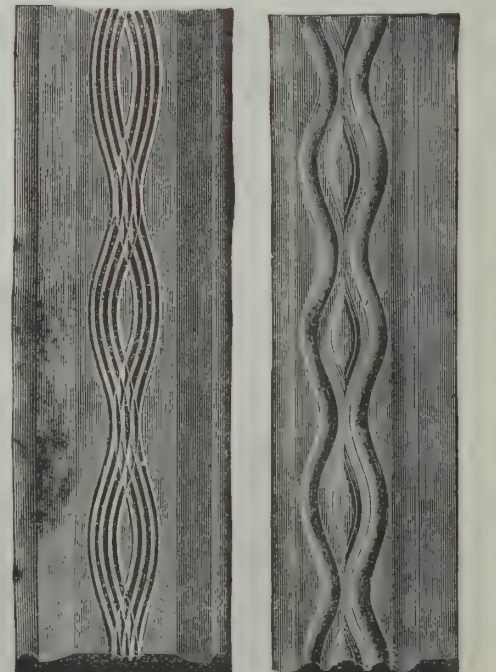
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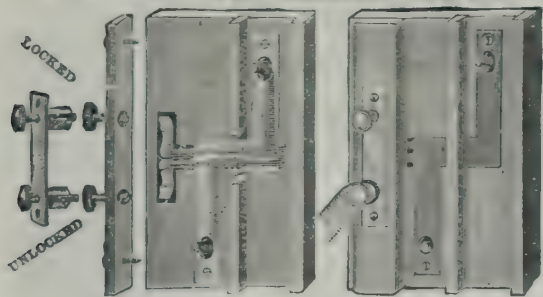
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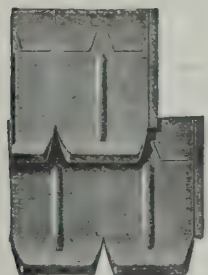
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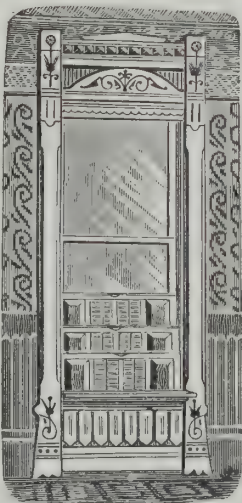
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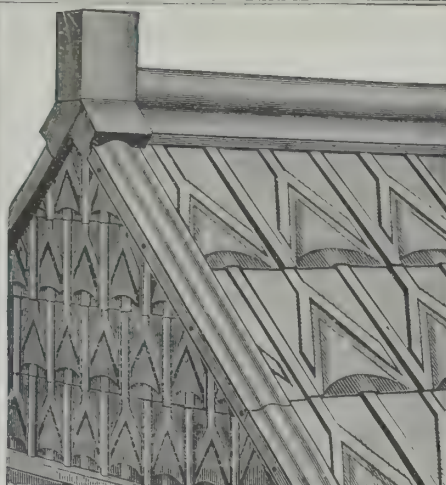
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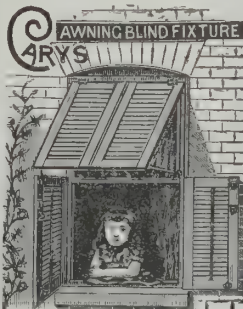
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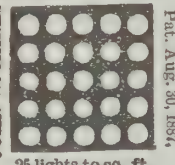
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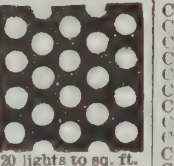


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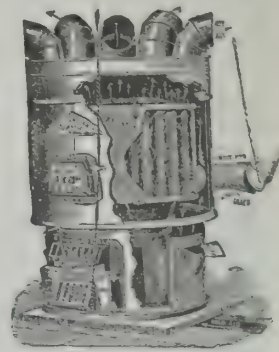




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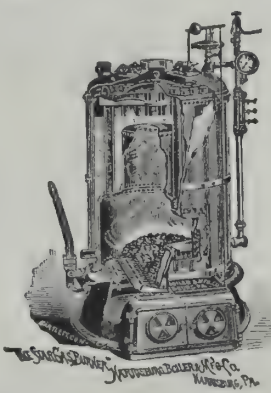
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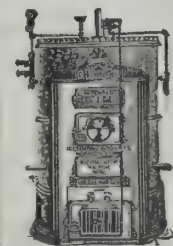


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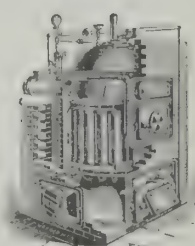
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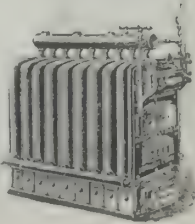


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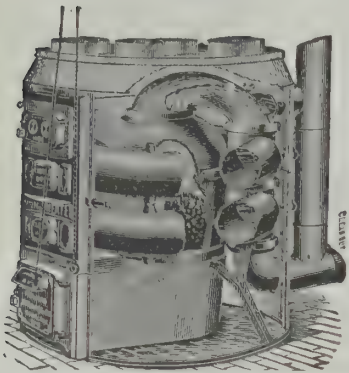




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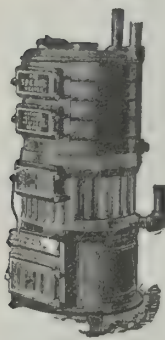
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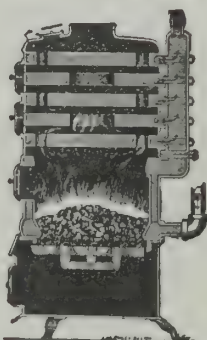
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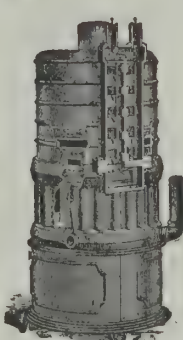
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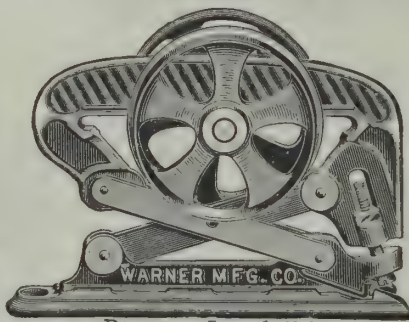
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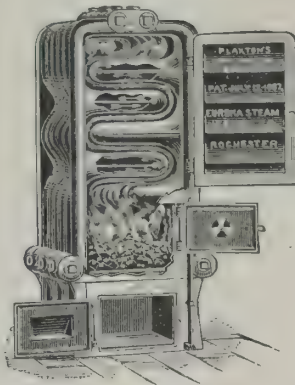
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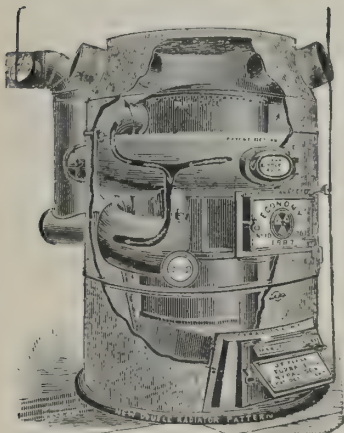
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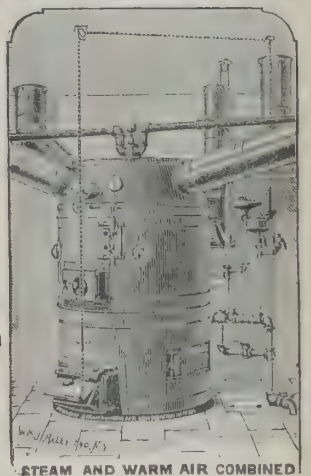
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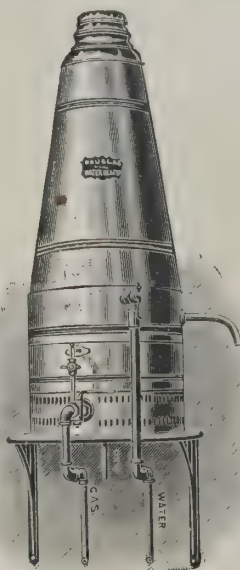
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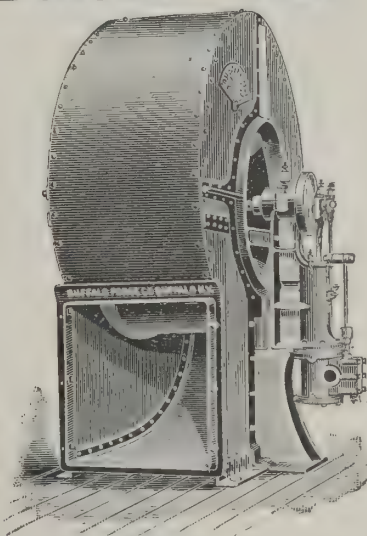
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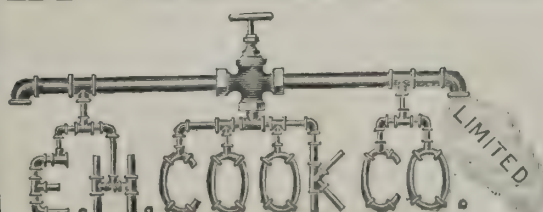
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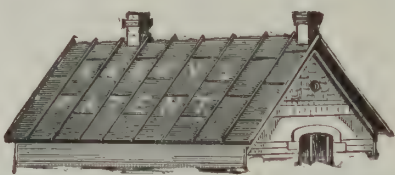
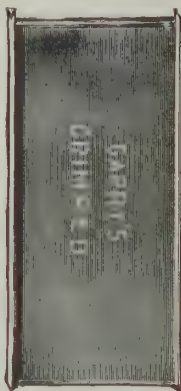


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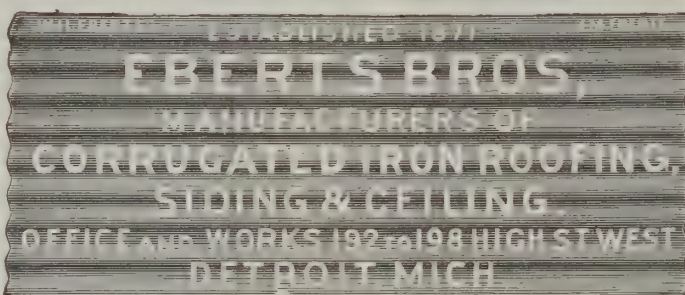
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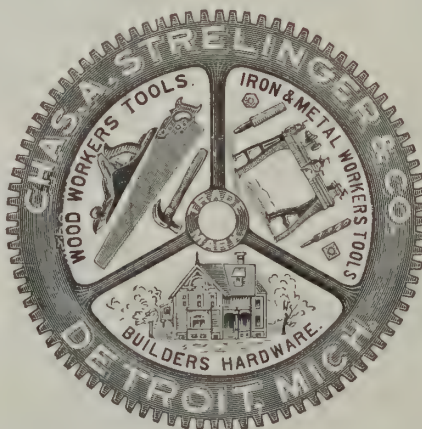
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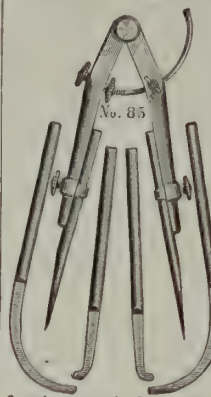
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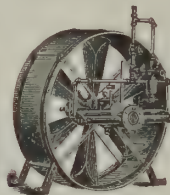
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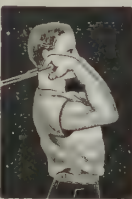
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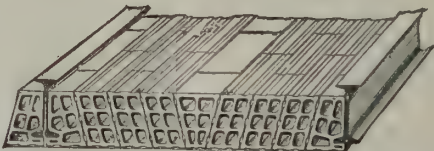
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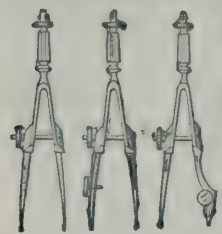




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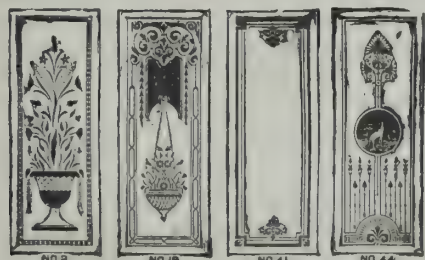
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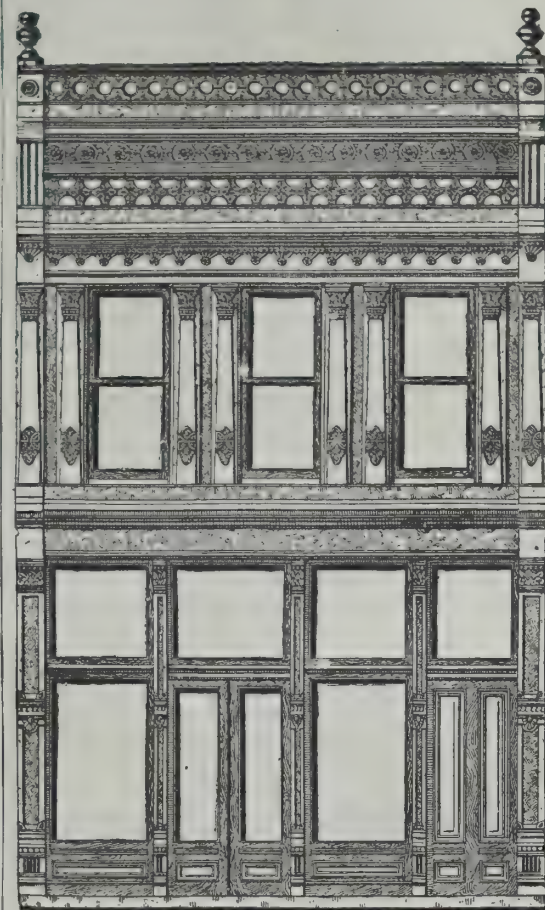
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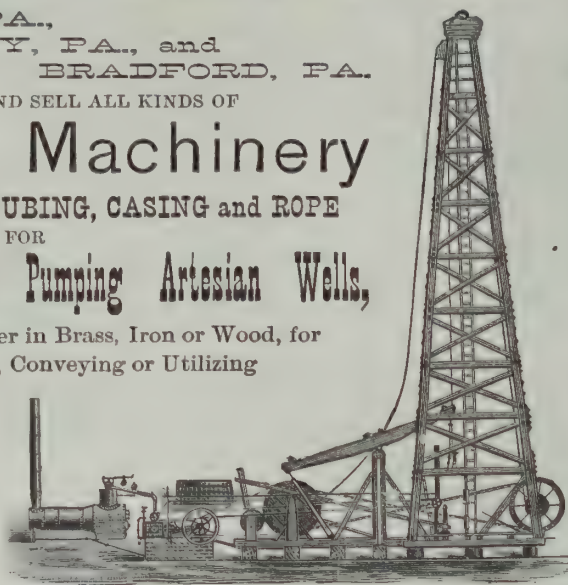
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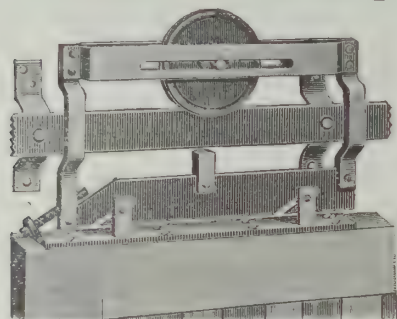
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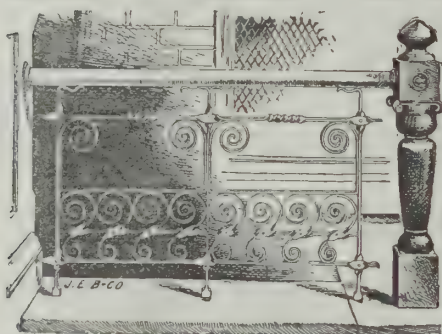
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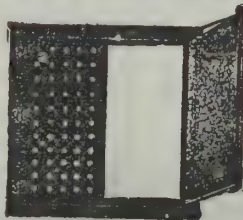
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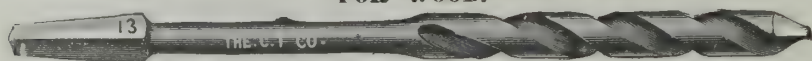
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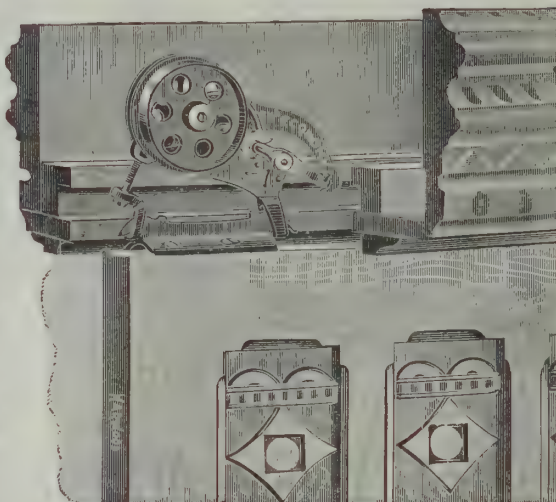
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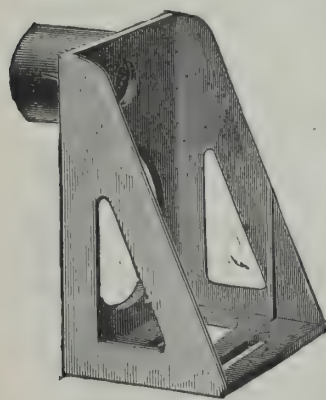
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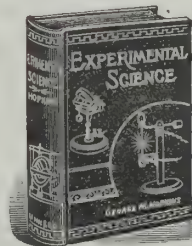
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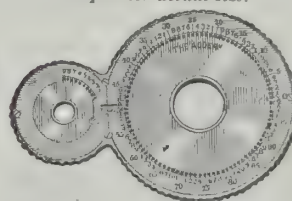
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(Continued from page iv.)

(6) S. & T. say: Having a reservoir full  
of water and a certain size of pipe out of bottom run-  
ning down a hill, will more water be discharged 200  
feet below than will be at 100 feet, say a 1 inch pipe  
throughout? The question is whether the additional  
fall will cause the water to enter the 1 inch any faster  
in the one case than the other. Should not the inlet be  
larger? A. If lengths between each station are the same  
no more water will be discharged at 200 feet than at 100  
feet. Make the upper section larger for more flow at the  
bottom.

(7) I. K. asks: 1. What is the surest way  
for a family to find out if there is any sewer gas in their  
house? A. Sewer gas has a peculiar pungent, sicken-  
ing odor; when once familiar with it a person will  
readily recognize it in a house. The surest way is to  
have a reliable plumber examine the premises. If you  
cannot trust a plumber, obtain the services of some of  
our sanitary engineers or experts. 2. What is the best  
way to clean or renovate old steel engravings? A. See  
SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 44, 115, 124,  
for directions for cleaning old steel plate prints.

(8) P. T. asks the best mode for pumping  
out a lake containing about 250,000 cubic yards water,  
the kind of pump to be used, amount of horse power  
to accomplish certain results, cost of pumps, etc. A.  
A pump and boiler capable of pumping out your lake  
in 50 days of 20 hours each will cost about \$1,000 in New  
York. Boiler 12 horse, steam cylinder 8x12, water cyl-  
inder 10x12. Much depends upon how high the water  
has to be pumped and length of pipes required, which  
for such a pump should be 6 inches suction, 4 inches  
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(9) F. F. writes: I see in your answers to  
correspondents you mention a furniture polish (shellac  
varnish). Can you inform me where I can get it, or  
how it is prepared? A. The following receipt is used  
by cabinet makers: Very pale shellac, 5 lb.; mastic, 7  
oz.; alcohol (90 per cent), 5 or 6 pints; dissolve in the  
cold with frequent stirring. This is used for French  
polishing, etc.

(10) E. F. R. Z. asks: Are there saws made  
to saw limestone? If so, where could I get one? A.  
Limestone is usually sawed with thin strips of iron and  
sand. A small piece may be sawed with a machinist's  
hack saw. A strip of tin stretched upon a frame like a  
wood saw with emery and water will do very good work  
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(Continued on page xii.)

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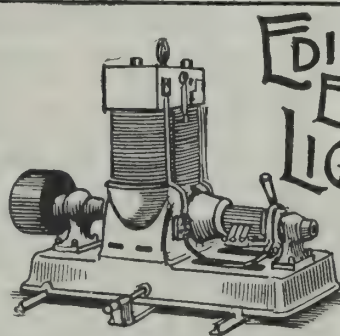
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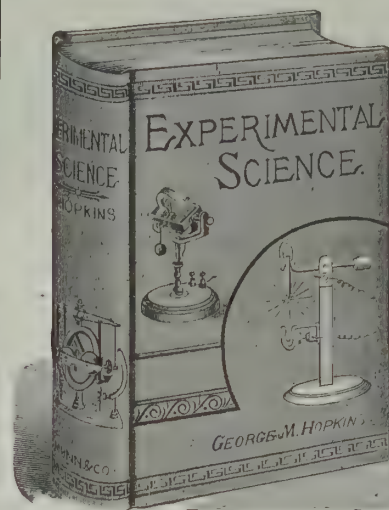
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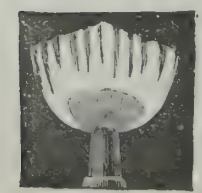
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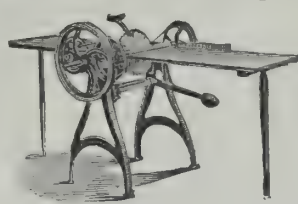
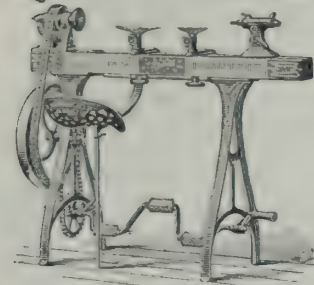


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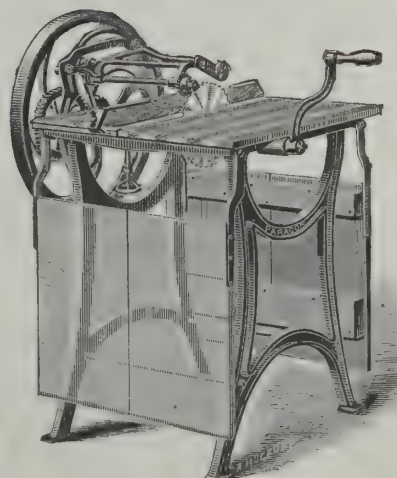
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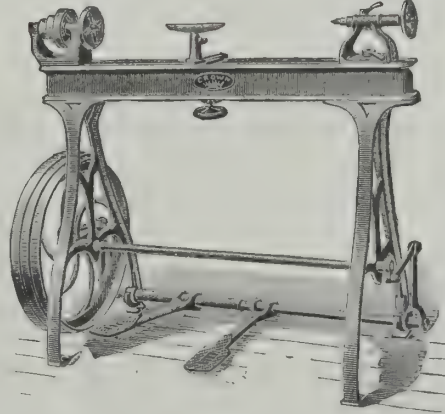
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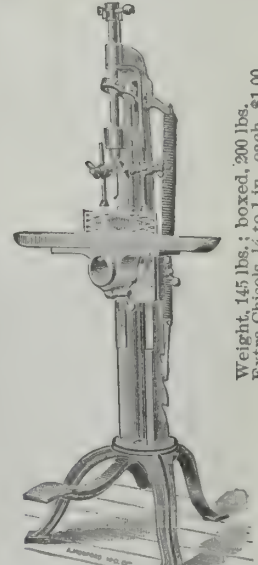


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In the belief that correct ideas and correct practice will insure your more profitable use of grinding implements and processes, we have taken the liberty of addressing separate and different circular cards to your Grinder, Foreman, Superintendent and Bookkeeper. We ask your own attention to one point only. That is, the great economy which would result from your employing a much larger quantity of simple, low-priced grinding machines, to do that work which is now most wastefully done by the old-fashioned processes of filing and chipping. Now it was demonstrated, in a series of careful experiments, that the maximum cost of grinding off one pound of cast iron was eleven and three-fifths cents, and that the minimum cost was two and four-tenths cents; while the cost of filing of one pound of cast iron was thirty-five and nine-tenths cents. Notwithstanding this overwhelming superiority, the proprietor generally puts in one or two grinding machines as a sort of sop to his Superintendent—to the mechanical progress of the times and to the pressing entreaties of the wheel-maker—and stops right there. A professor of mechanics, who visited our grinding room once, looked aghast at the flying sparks and the disappearing metal. He said that shop was "a regular cast iron slaughter house." When we in turn inspected the technical machine shop over which he presided, we found it provided with bench room and nine vices, but only one grinding machine.

The zeal of machine builders has led, of late years, to the getting up of a countless variety of complicated special machines, some of which are well calculated to do difficult and exact work, while many have been devised by men of but slight experience in the use of solid wheels, and merely look well on paper. We urge here, as we have persistently done, that the greatest economy lies in the greatly increased use of wheels and machines for simple, general work.

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It is for your own interest to turn out the very best work possible, and as much of it as you can. The Emery Wheel is your tool—it should be your servant. The more work it does, and the better, why then, it is the better for you. If you use a very hard wheel, you will have to do the work over and over again, and on the wheel as fatigues you. If you use a soft wheel, then it does the work, and your fatigue is less. The less tired you are the more work you can do. The less pressure you are forced to use, the more you can use your hands to guide the metal you are grinding, and thereby you can do better work. Wheels which cut freely under light pressure are the easiest wheels to use.

If you can keep the metal you are grinding against the wheel all the time, it will be the same as if you passed a file one mile long over your work in one minute's time. If your wheel runs below the proper speed, or if it gets out of true, or if it jumps and chatters, then you can't do this; and besides, the jar of the metal and wheel will be tiresome and unpleasant. The proper speed is generally the one dictated by the maker of the wheel. A very cheap speed indicator (to carry in your vest pocket) will tell you if the speed is right. To keep it so, your belts must be looked after and tightened if they stretch or get loose enough to slip. If your grinding machine is of too light weight, or stands unsteadily, a few wooden braces to the floor, wall or ceiling, will stiffen it. If your wheel gets out of true, it should be made true again with a diamond tool; and this ought to be done just as soon as you notice the wheel has worn unevenly. You can do this yourself, with a hand tool, without taking the wheel off the machine. All wheels, even the very best, will wear out of true under hand work, and need frequent turning up. Chipping or hacking the high edge of a wheel is a rough, brutal, unmechanical remedy, and no wheel is fit for use which needs such chipping to make it cut.

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TO THE  
FOREMAN.

The men under your direction will work with more profit to themselves and their employer if the tools and machines they use are of such kind and in such order that they turn out the most goods possible, of the best quality, and with the least danger, fatigue and annoyance. These men will be on better terms with you if you make their work easy and profitable. To do easy and profitable work, grinding machines and wheels should be placed in convenient positions—belts, pulleys and revolving set screws should be out of the way or enclosed—just should be removed by suction fans—machines of ample weight should be so mounted that they run with the least possible shake, and good Emery Wheels should be used. As all makers claim to make good wheels, and as your Grinders will give you the most confusing opinions, we offer a few ideas as to what is a good wheel. A good wheel is that

which cuts freely when the metal being ground is applied with moderate pressure—which does not quickly glaze over and clog up with metal—which does not throw off chunks or bars—which does not have to be backed and chipped to make it cut, and which can be applied to the greatest variety of work under varied conditions, with the certainty that it will do fair, average work, with few stoppages for any cause. From 15 to 25 different makes of wheels are offered for sale in the United States. Of these very few are too soft, and nearly all too hard. Very many of these need to be backed and chipped to make them cut, and require such excessive pressure as to weary your men. Nearly all do their best cutting when first used, but glaze over with metal, and do less and less work the longer they grind. Some are unsafe at the speed of a mile a minute, which has been adapted by the best makers, and a lower speed is named. Any wheel which cannot be run at a speed of a mile a minute without clogging or coverings, or mechanical helps and reinforcements, is unfit for general use.

WITH THE COMPLIMENTS OF

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TO THE  
SUPERINTENDENT.

If solid emery wheels are used in the factory you manage, it is because they are labor-saving and money-making tools. It is of importance that they save the most labor and make the most money. Ordinary grinders can use them, and ordinary foremen keep them in proper condition; but to attain the greatest economy, sound judgment and technical skill are needed. It is hardly necessary to plead with you for high speeds, free cutting wheels and solid machines. We might as well ask you to run your circular saw by steam and to keep it sharp. But we do need to point out that no ordinary grinder or foreman is likely to make a correct estimate of a wheel's money value. There are too many factors in the problem. The actual cost per pound of grinding off metal is the thing to get at. Power, time, pressure and wheel-wear all have to be taken into account. So, too, do incidental stoppages and accidents. Too often wheels are accepted or condemned on superficial and mistaken observation. This is most apt to occur when some different make of wheel is on trial. For instance, nearly all American makes are too hard. Through long use, however, the men become habituated to the poor tool, and compensate for its defects by wearing themselves out with excessive pressure, or wearing the wheel out by hacking and chipping. If one of the free cutting makes is then offered for trial, the grinder applies the same excessive pressure, and wears out the free cutting wheel so fast as to make it appear wasteful. He ought to lessen his pressure, and thereby save both the wheel and himself. At such trials, over-hard wheels are often accepted, because the observation is made during the first few minutes' use of a fresh wheel. Now it is a demonstrated fact that of ten different makes, scientifically tested, only two maintained their cutting capacity to the last, while all the rest did their best work in the first few minutes, and then steadily deteriorated.

When we offer you better goods at a reasonably higher price than the old ones, we are not asking you to change old wheel suits. So does an old shoe, wrongly shaped and badly made, suit better than a new one, till the new one is broken in.

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TO THE  
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As our invoices come under your notice, the comparative prices of our goods are matters of consideration. Please note our views on this subject.

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**EMERY.** Our control of the crude ore is such that, coupled with our improved appliances and processes, we can supply emery at prices lower than you can buy it elsewhere. Twenty-three years of experience in the use of this article enable us to assure you as to the quality of these goods.

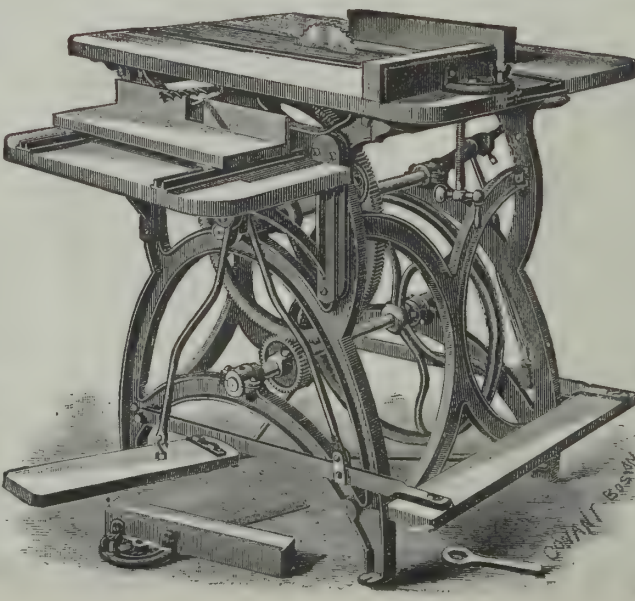
**EMERY WHEELS.** Our prices for these goods are about the highest in the world, but their value justifies the price. These wheels are productive tools and their value depends on their productive capacity. Many other makes are in use, and such use is apparently satisfactory; superintendent, foreman, and sometimes even the grinder working by the piece agreeing that they see no use of changing to higher priced goods. Our answer is that the higher priced goods are safer and cause fewer accidents to life, limb and surrounding machinery; that they save time, because they call for fewer stoppages for break-downs and repairs; that their productive capacity is greater, because they grind off more metal in a given time, and because they cut more freely, and so require less pressure and cause less bottle-fitting to the grinder.

**MISCELLANEOUS GOODS.** Our prices on these goods, such as Diamond Tools, Whet Stones, Knife Sharpeners, etc., will be found justly proportioned to their value.

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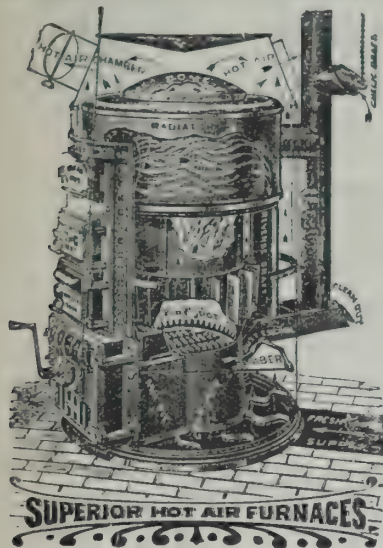
Iron frame 36 inches high. Top 30 x 40 inches, centre part of iron with planed grooves on each side of saw for cutting off gauges to slide in. Rippling gauge slides in iron groove. Steel shafts. Gears are all machine cut from solid iron. Boring table and side treadle. Two 6-inch saws and two blocks with saw machine. Weight 350 pounds.

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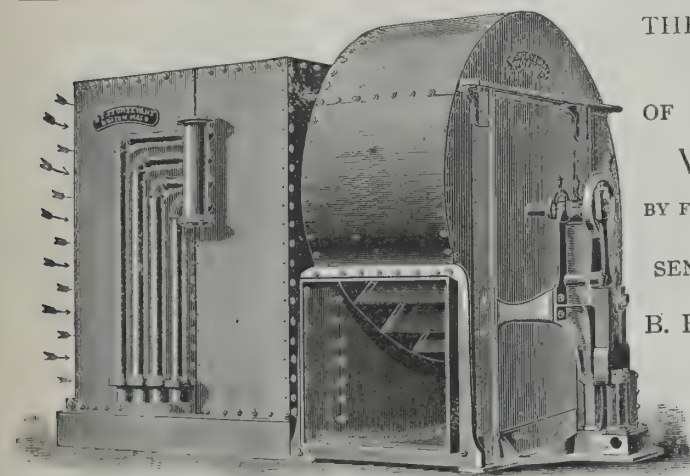
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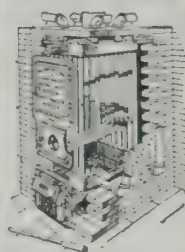
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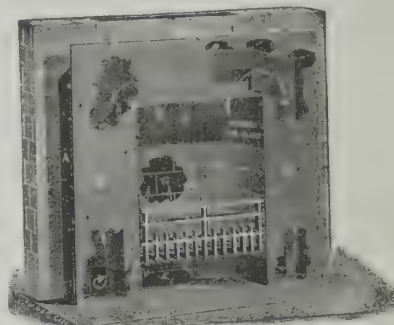
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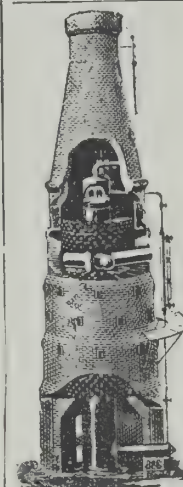
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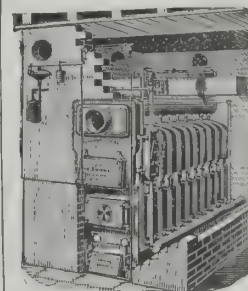
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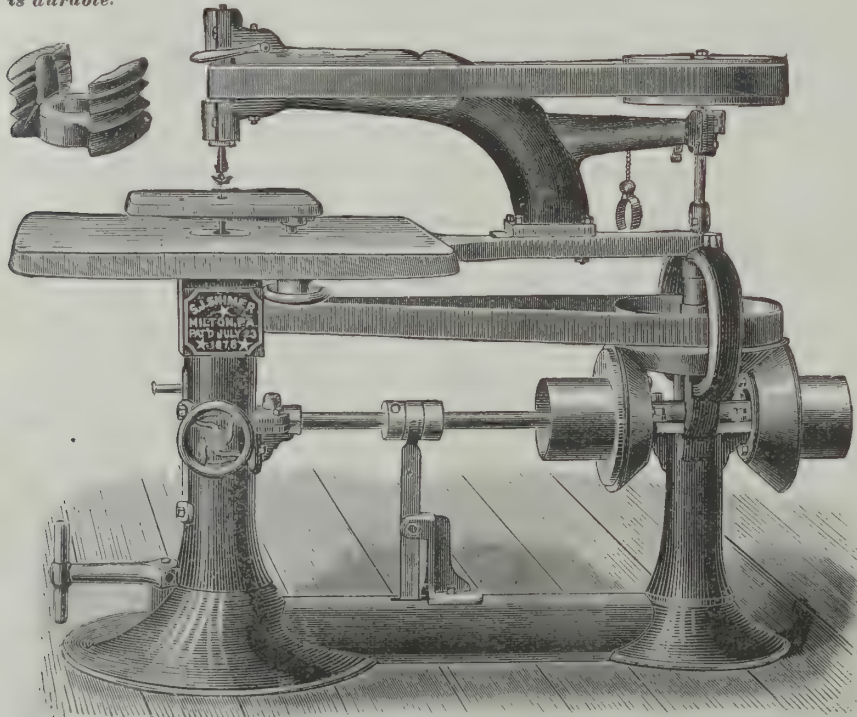
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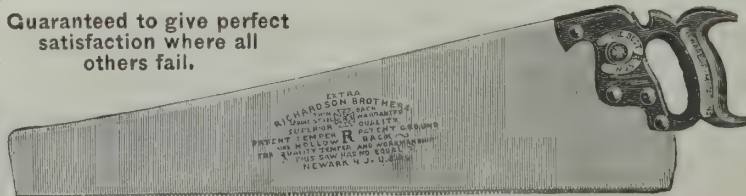
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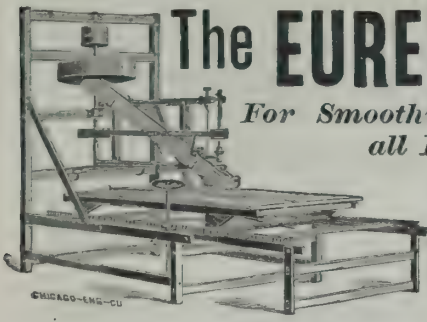


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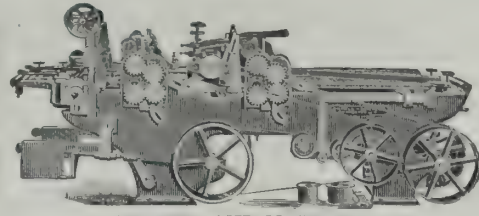
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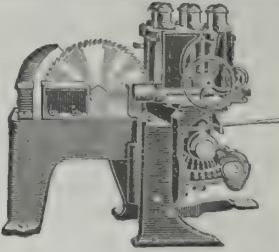
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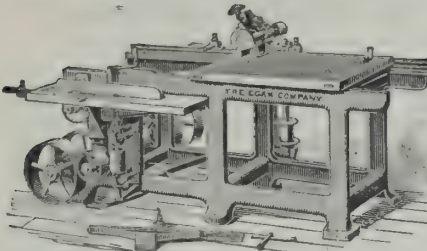


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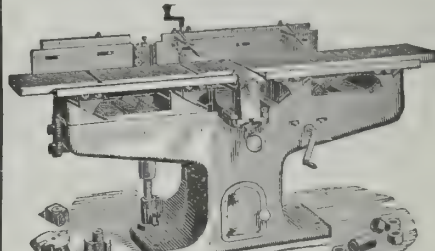
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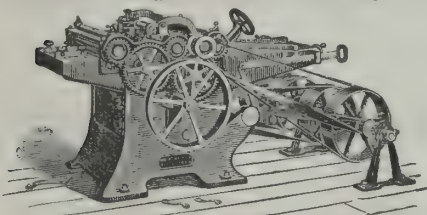
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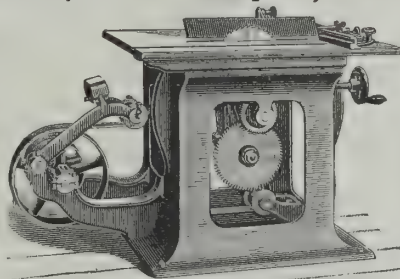
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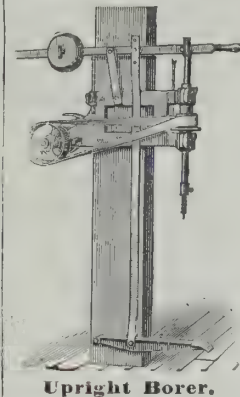
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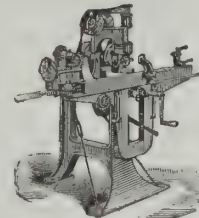
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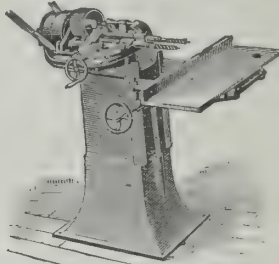
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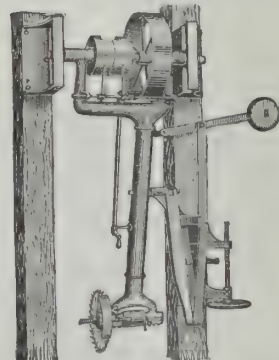
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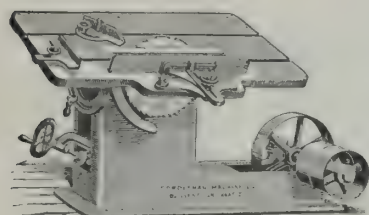
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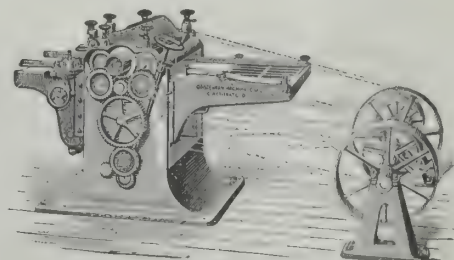
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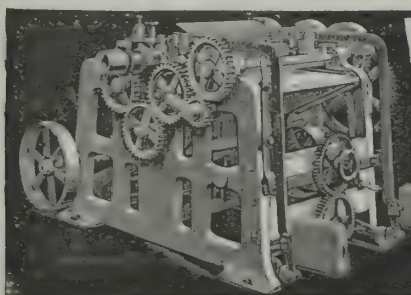
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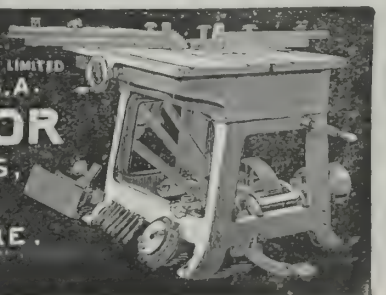
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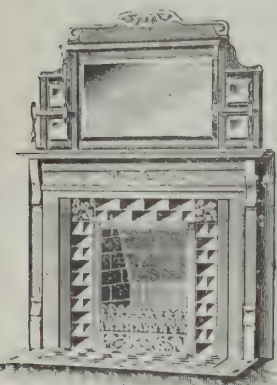
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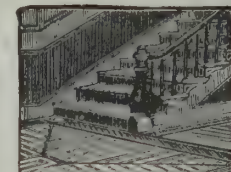
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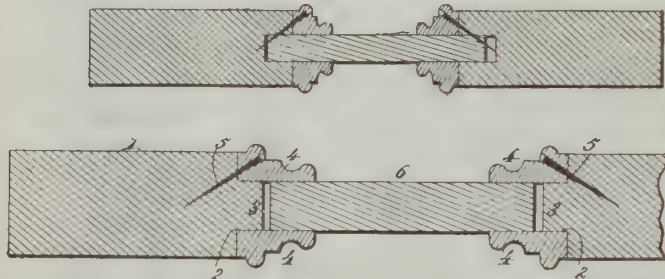
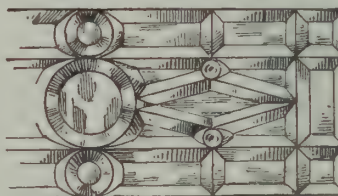
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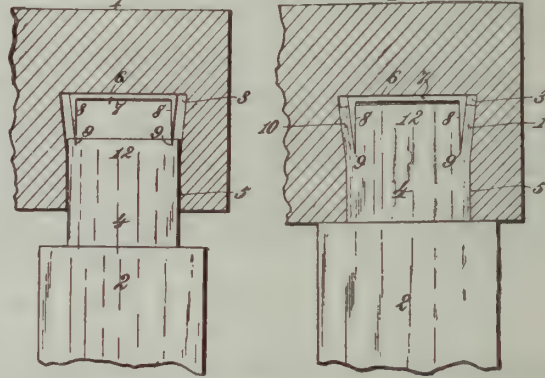
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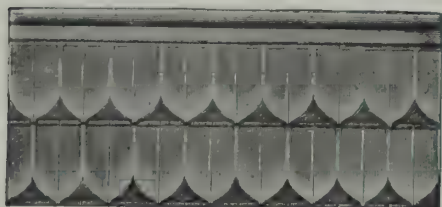
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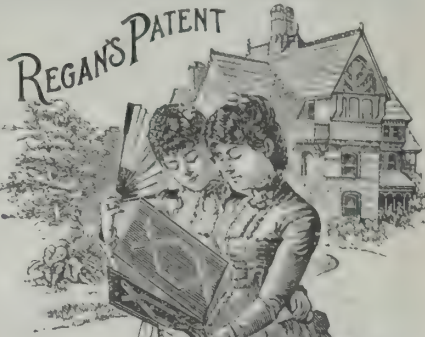
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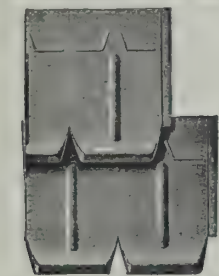
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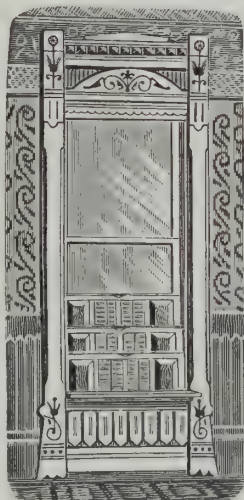
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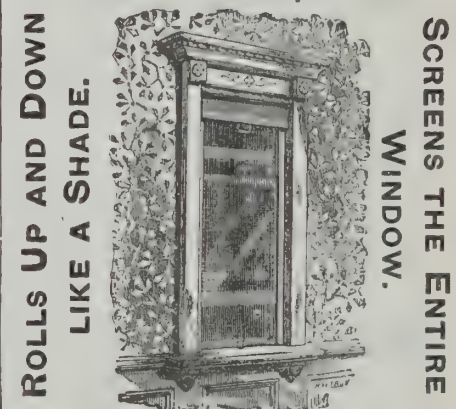
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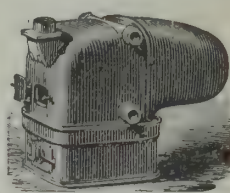
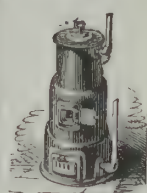
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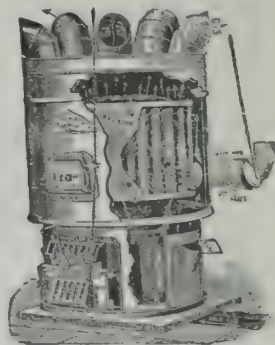




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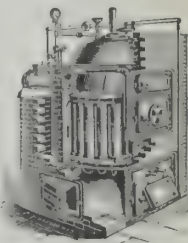
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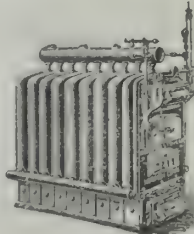


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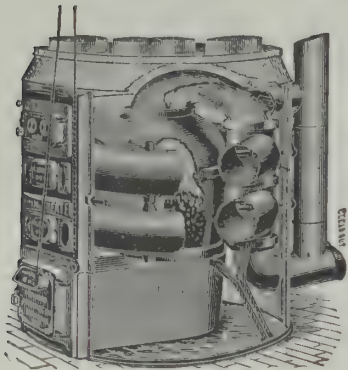
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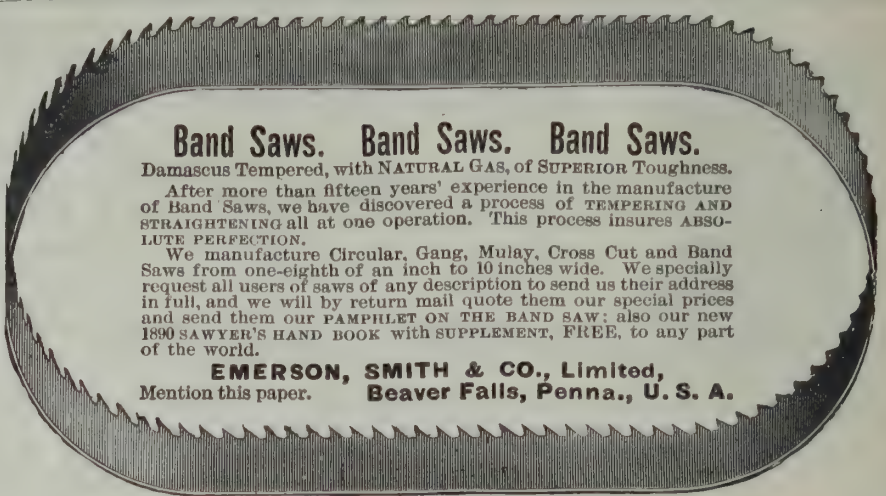
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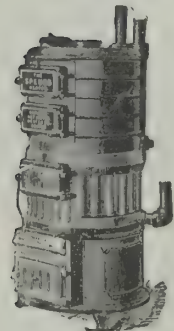
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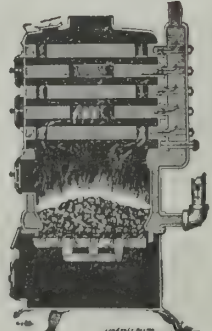
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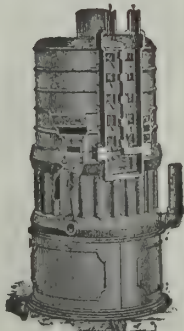
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Note attractive design.



Note complete arrangement of flues.



Note course of independent circulation.

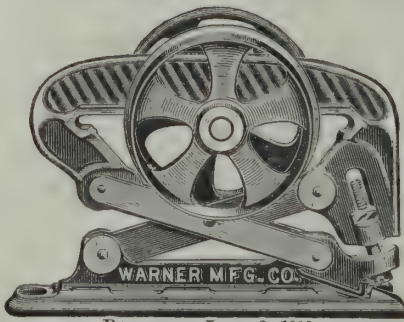
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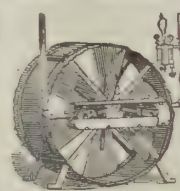
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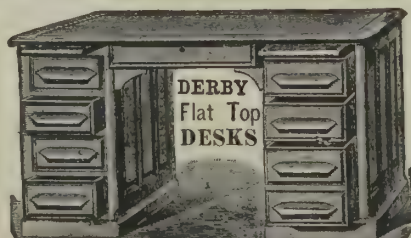
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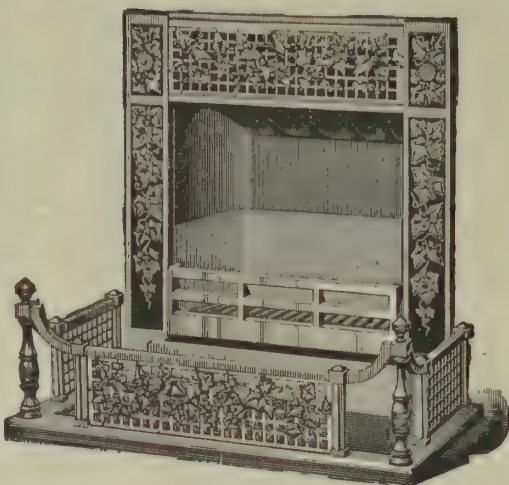


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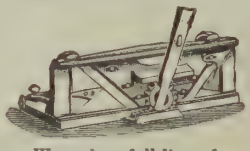
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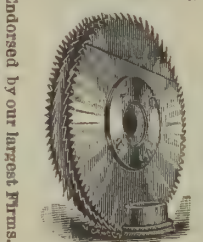
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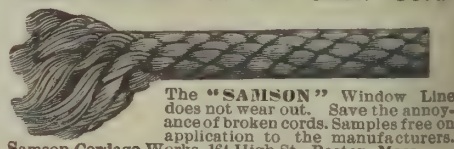
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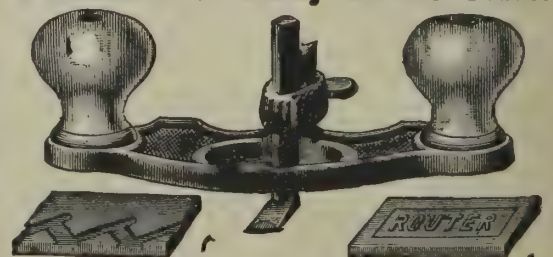
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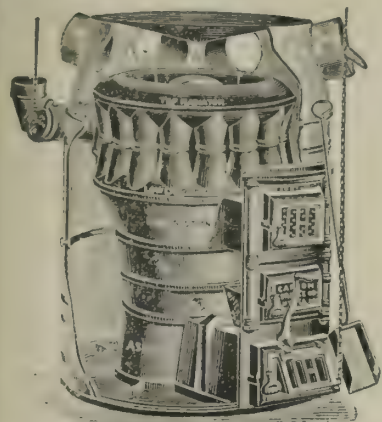


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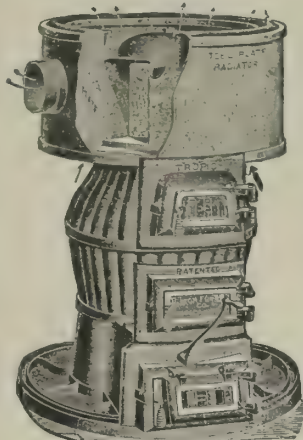
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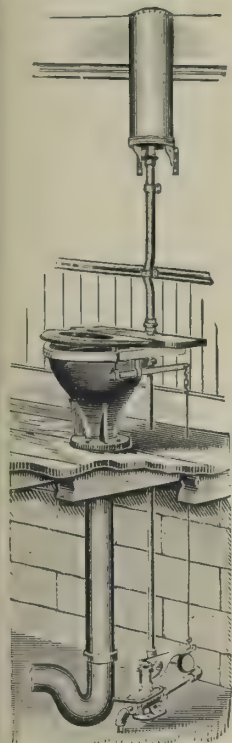
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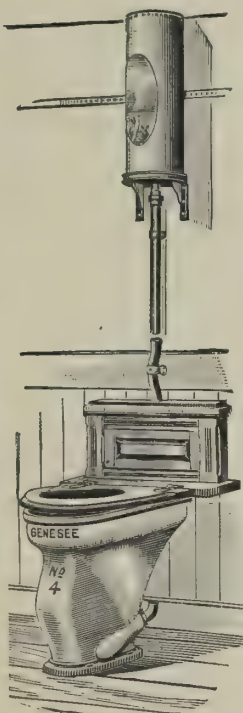
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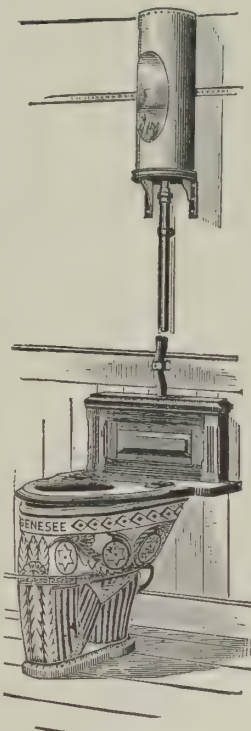
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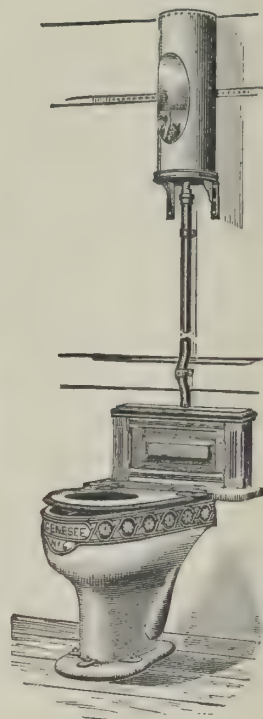
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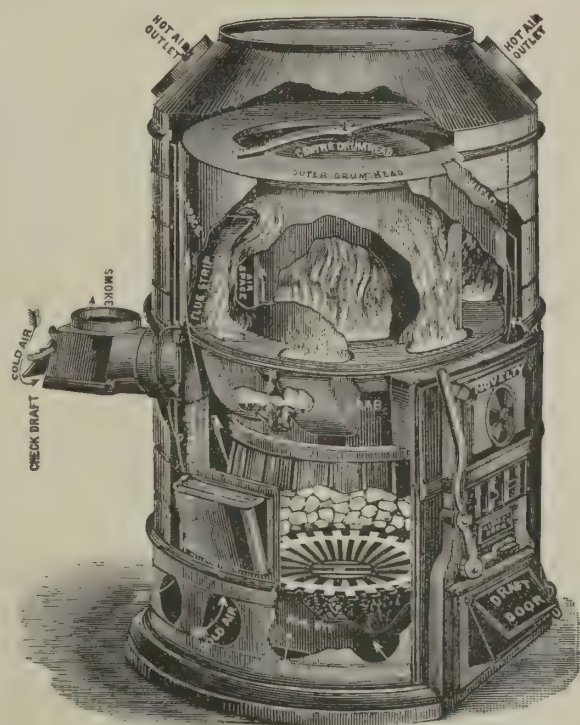


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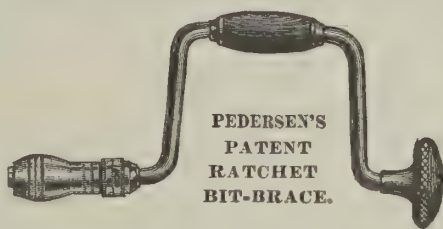
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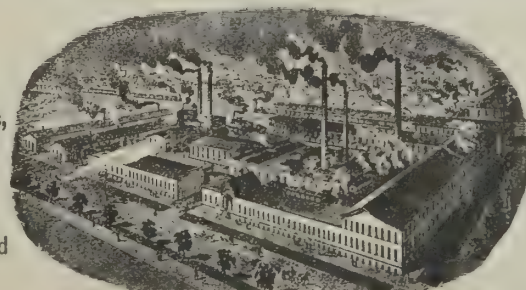
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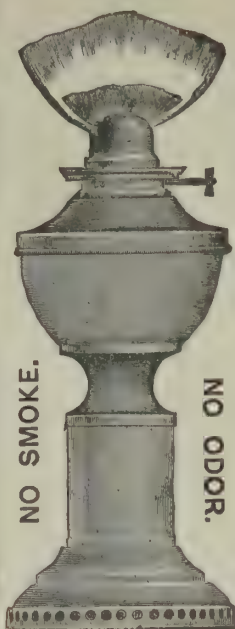
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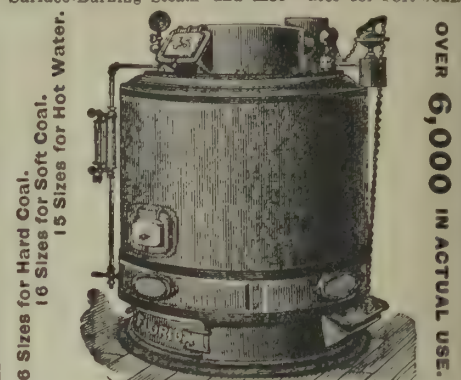


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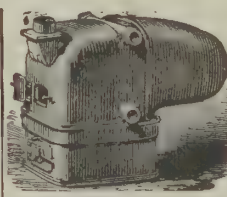
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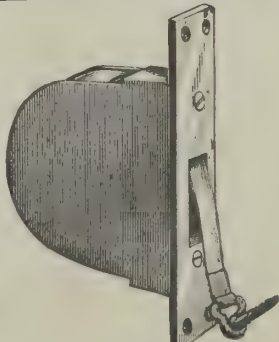
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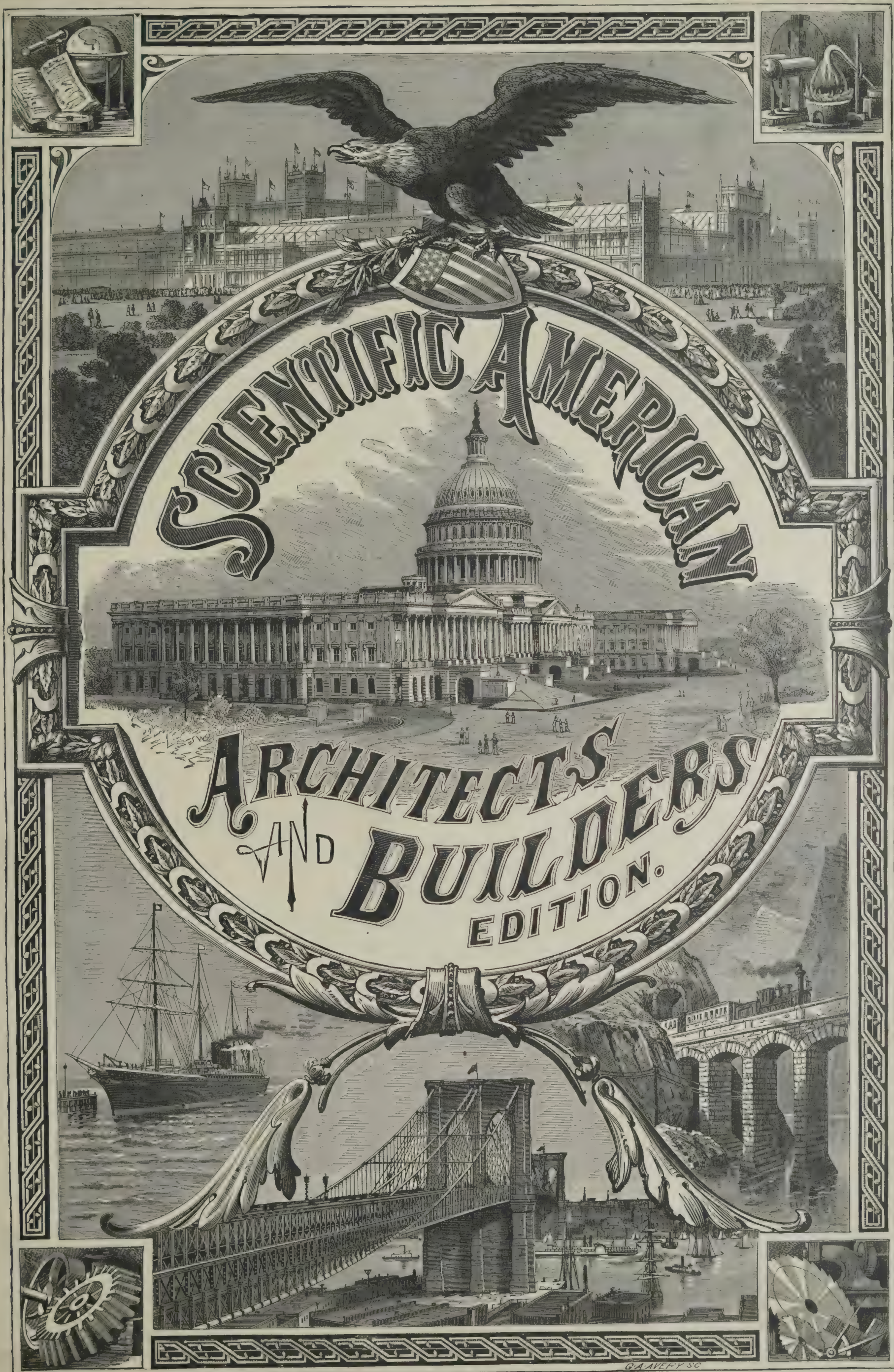
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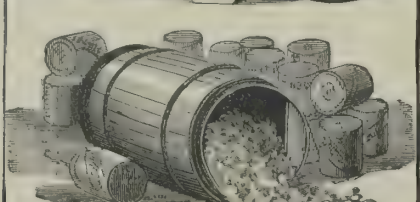
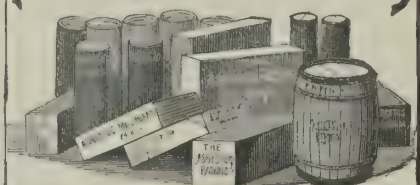


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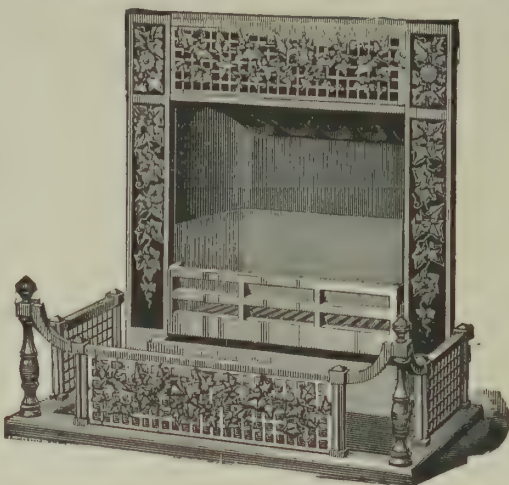
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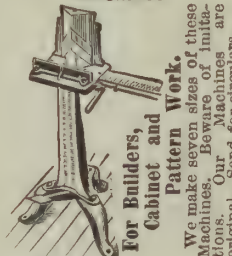
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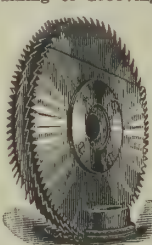
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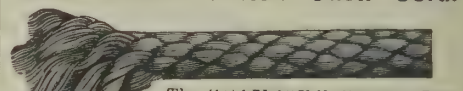
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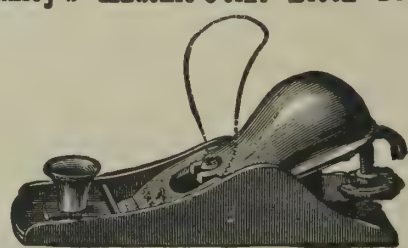
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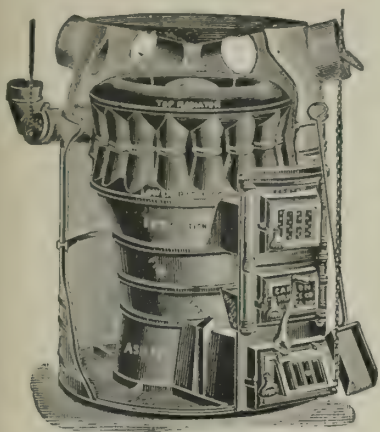


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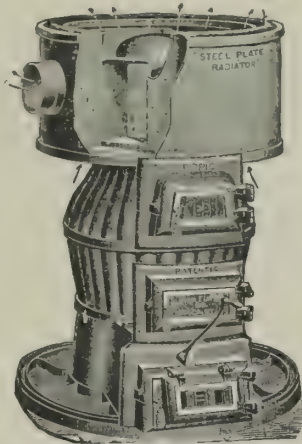
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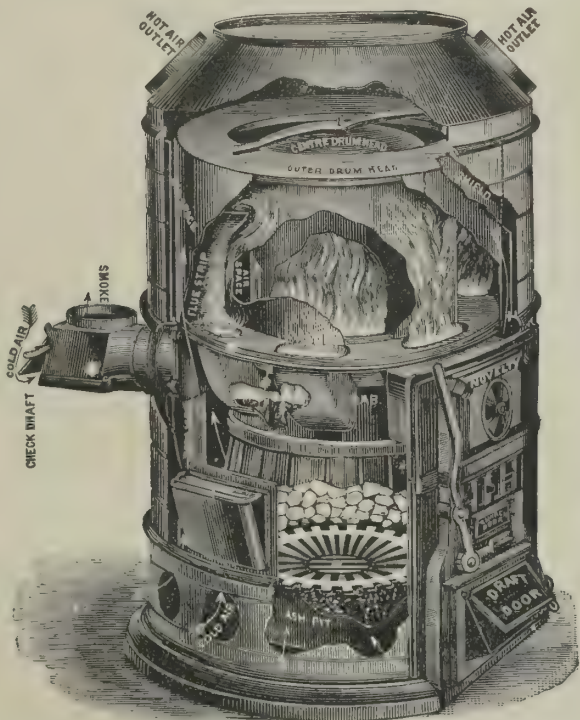


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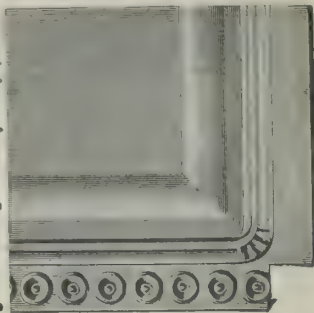
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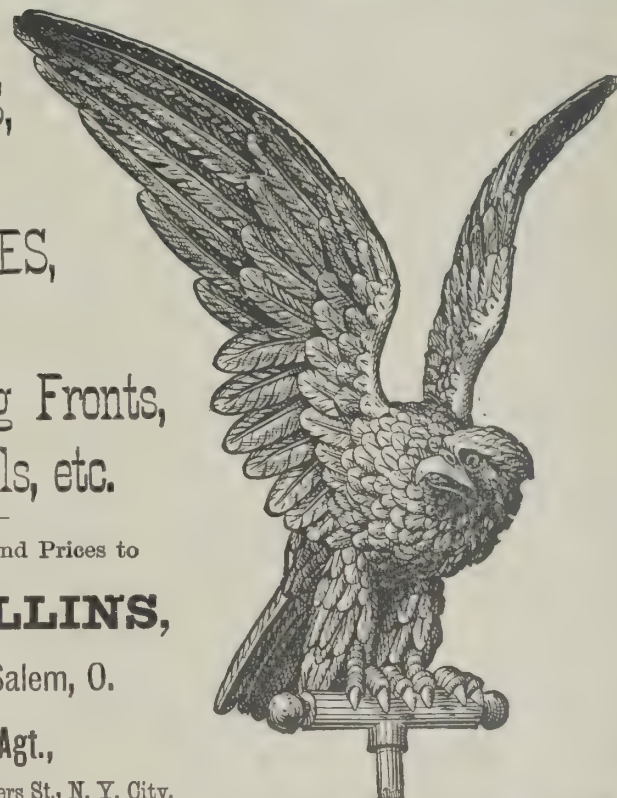
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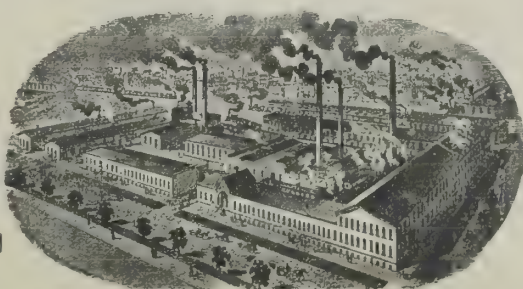
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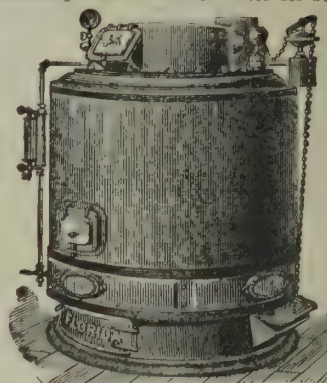
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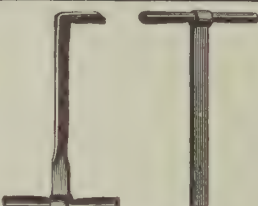
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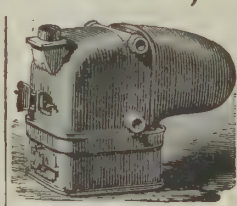
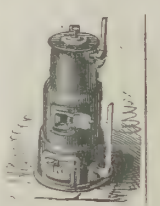
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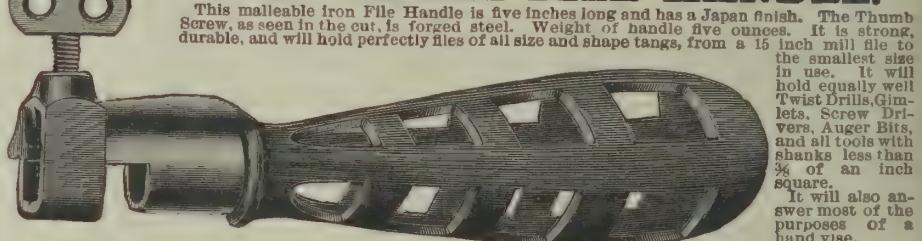
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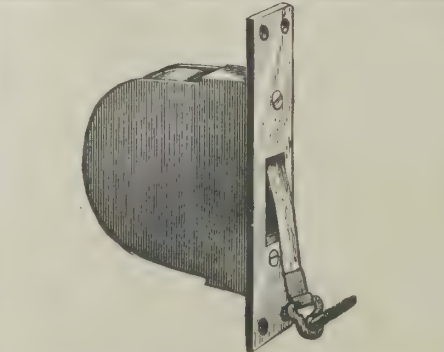
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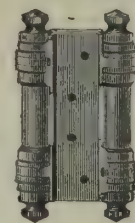
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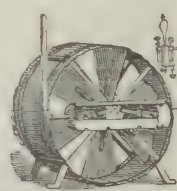
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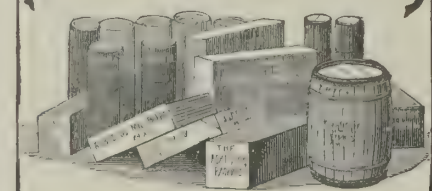
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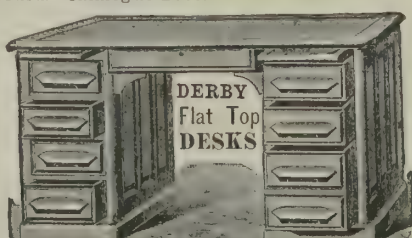


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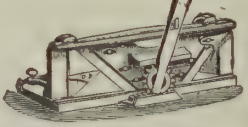
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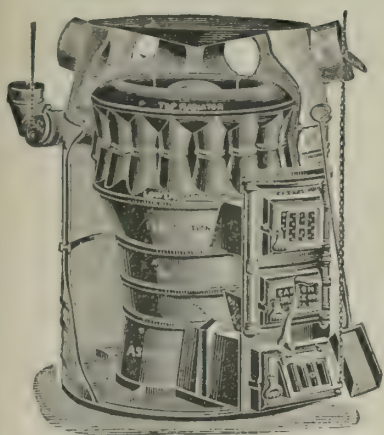
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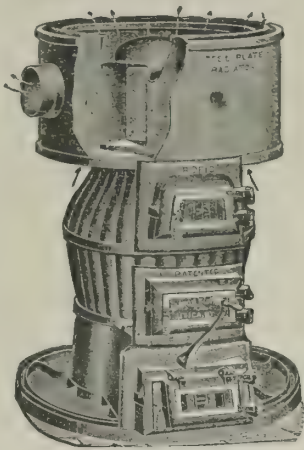
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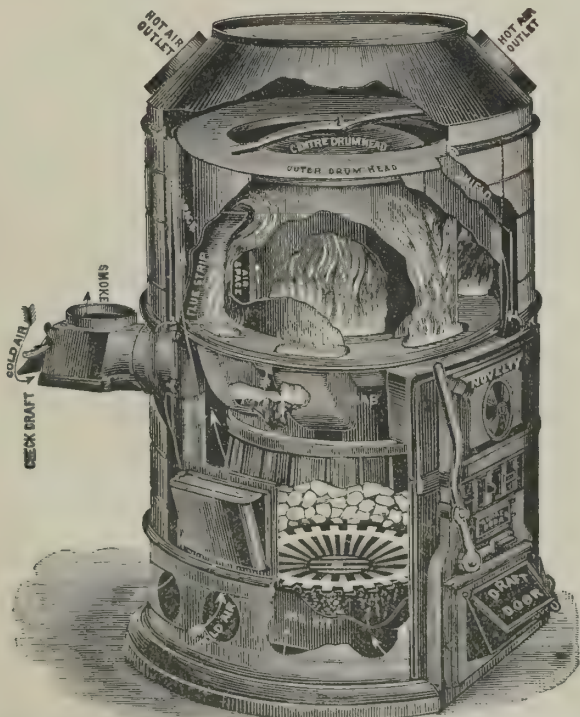
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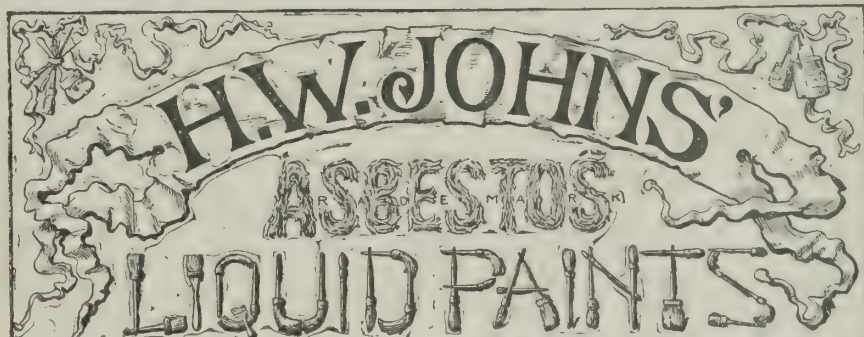
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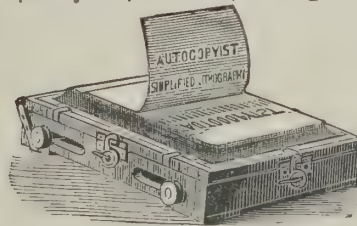
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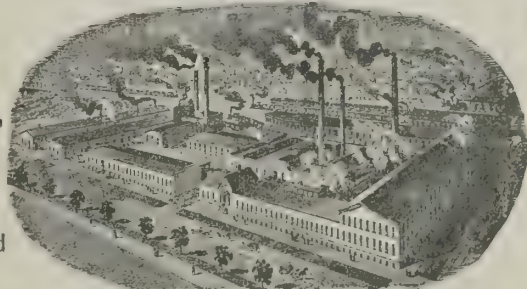
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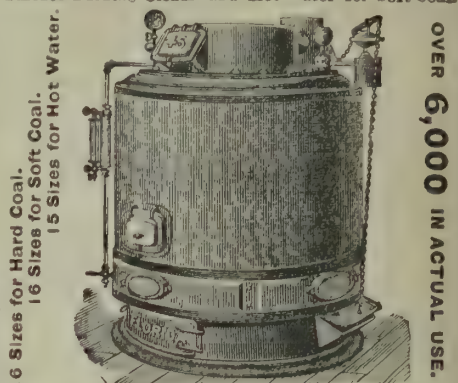


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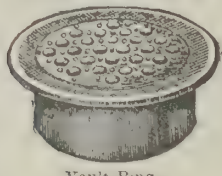
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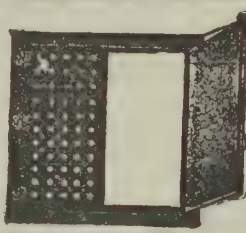
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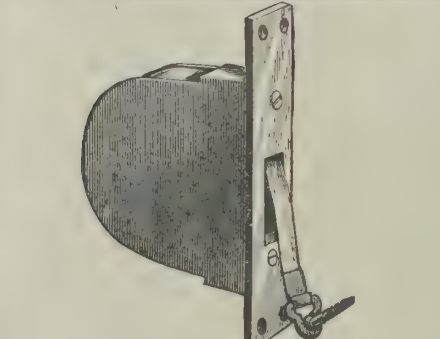
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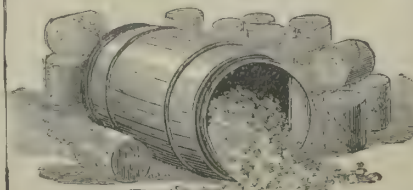
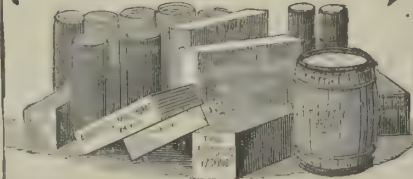
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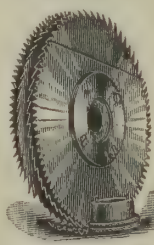
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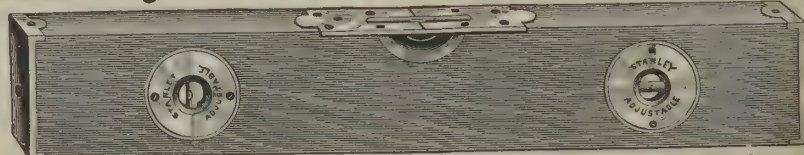
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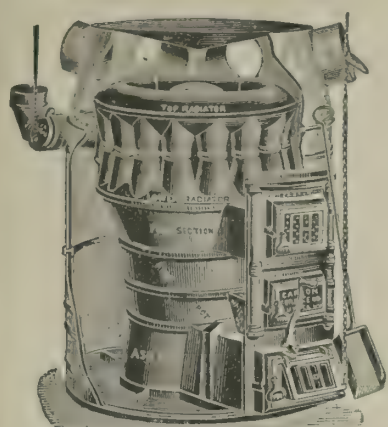
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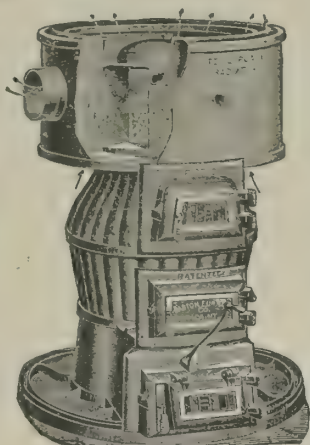
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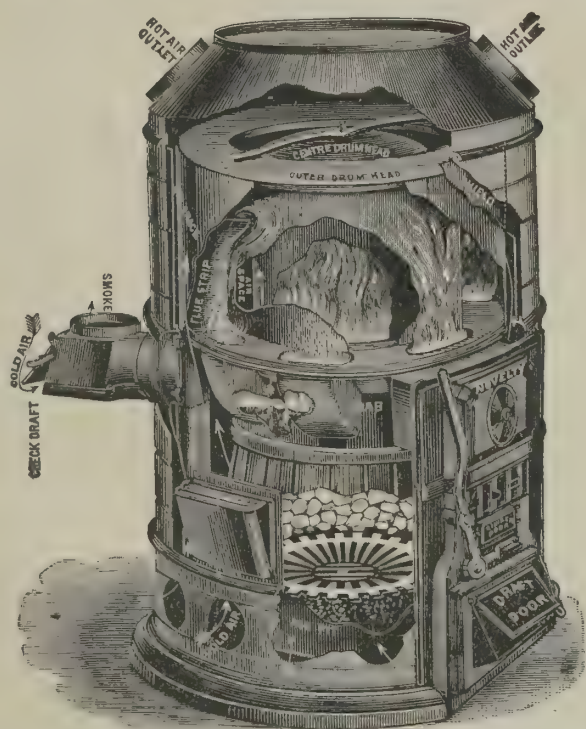
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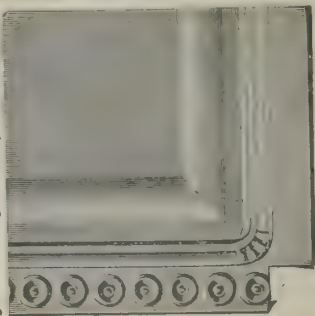
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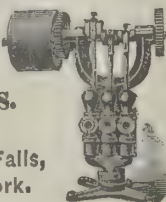
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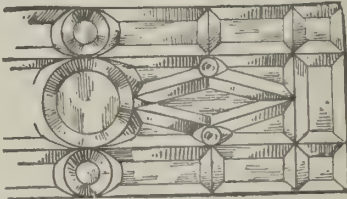
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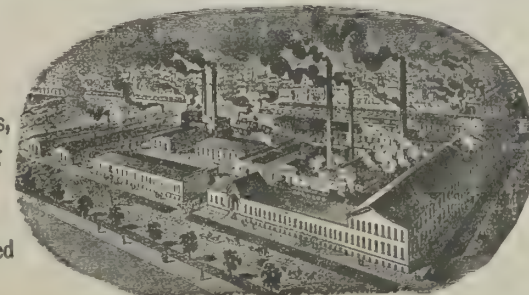


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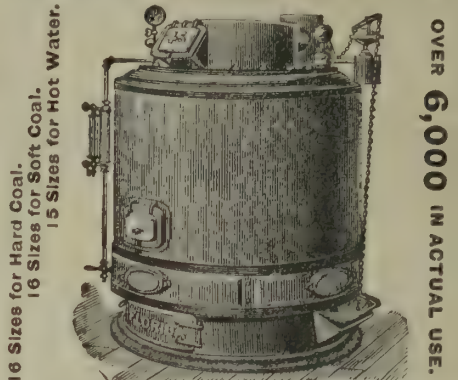
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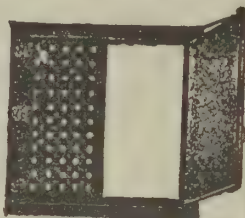
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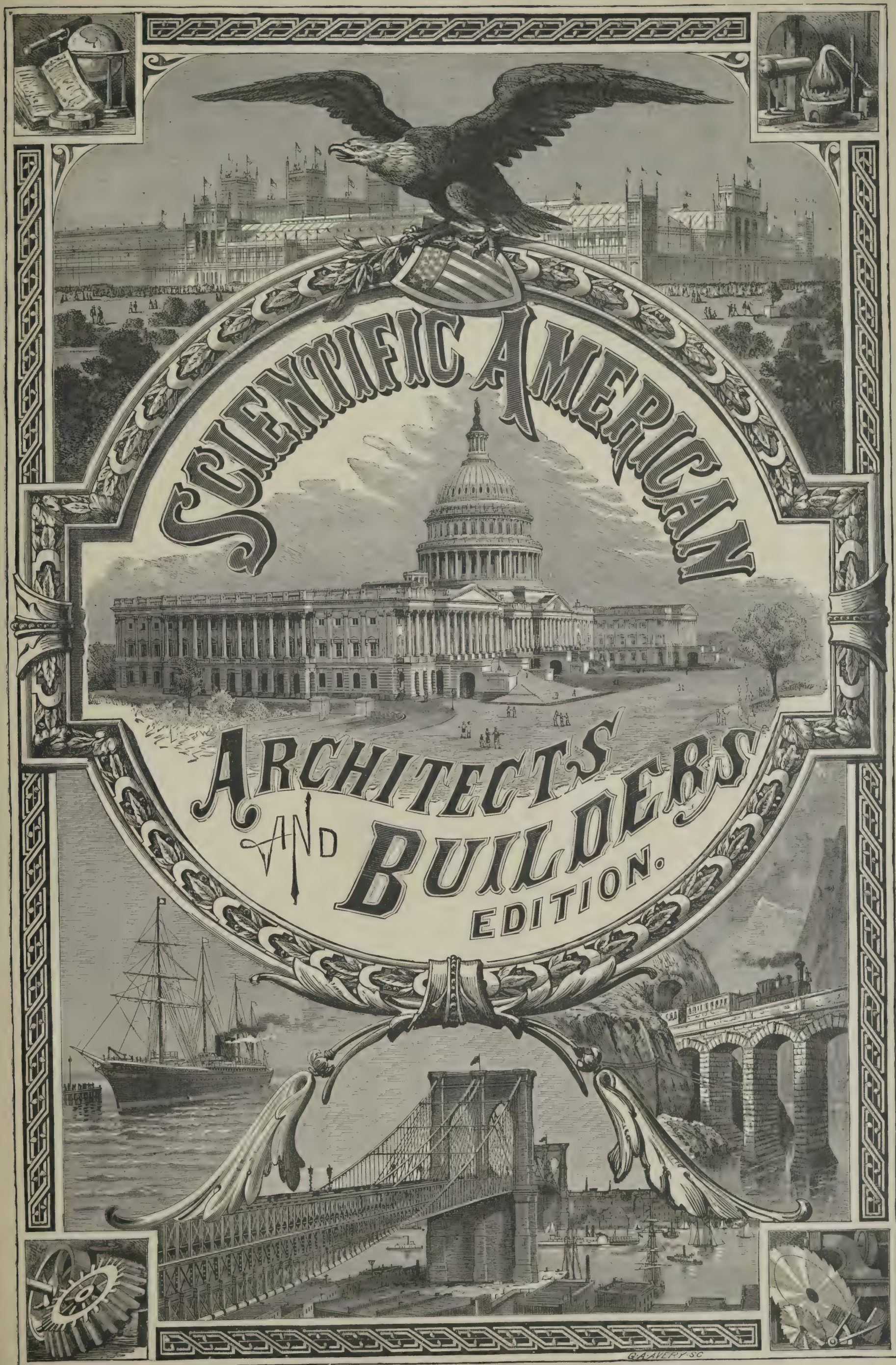
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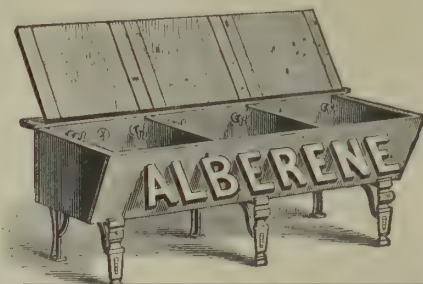
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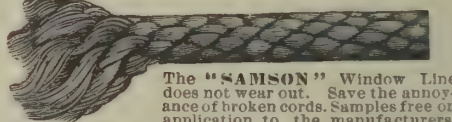
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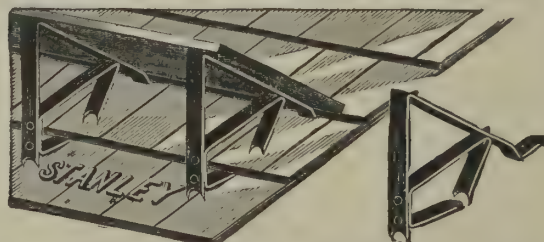


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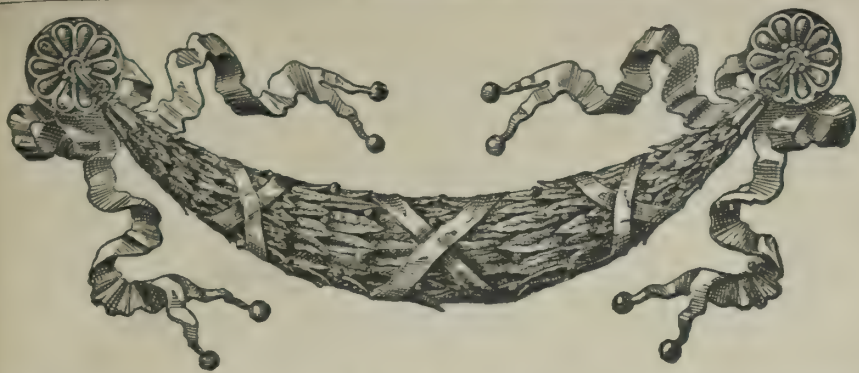
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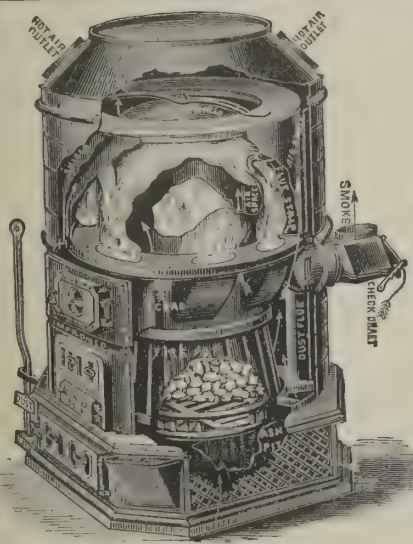
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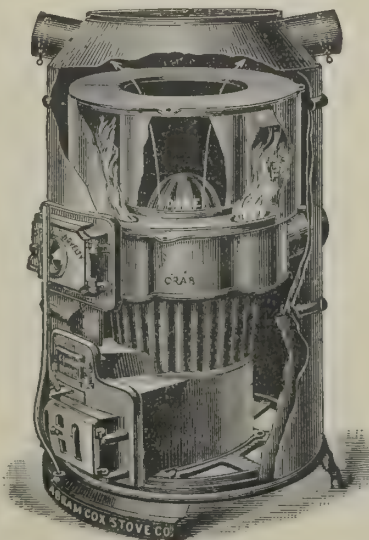
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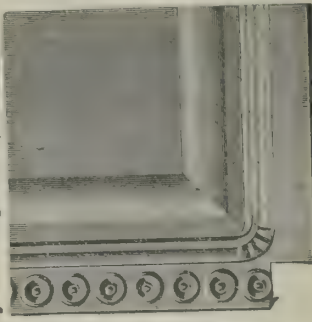
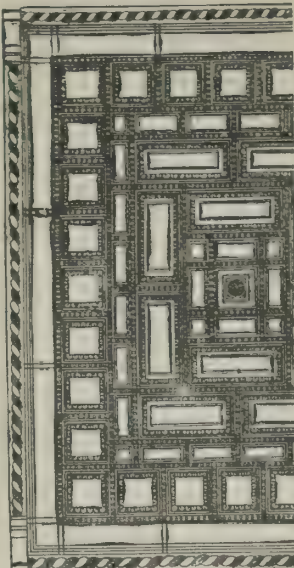
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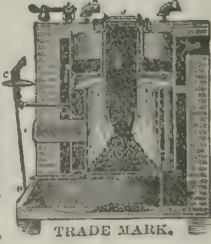
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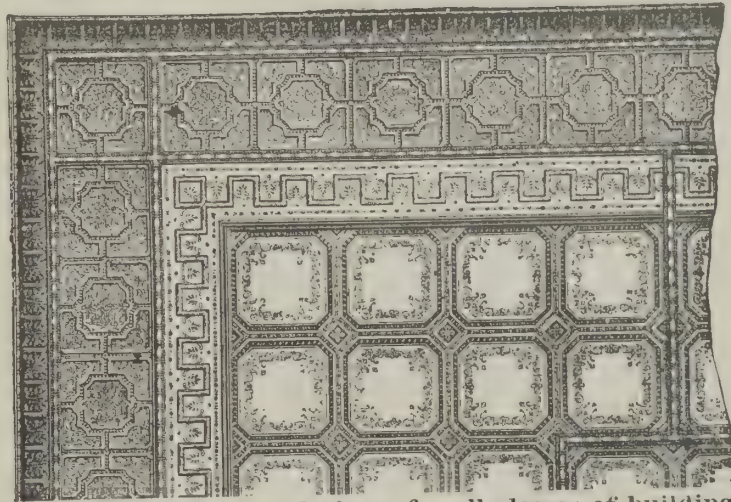
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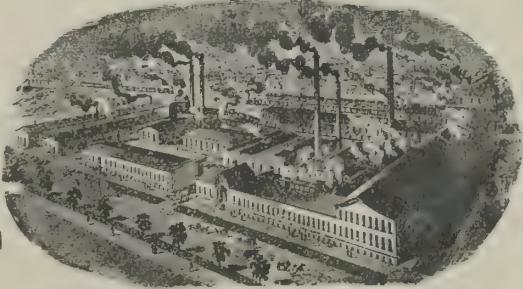
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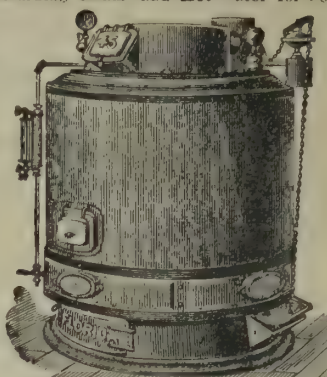
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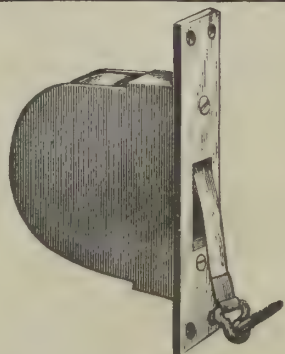
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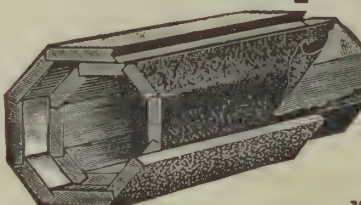
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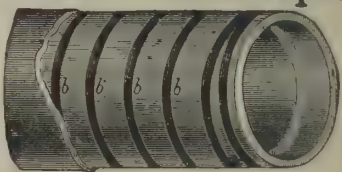
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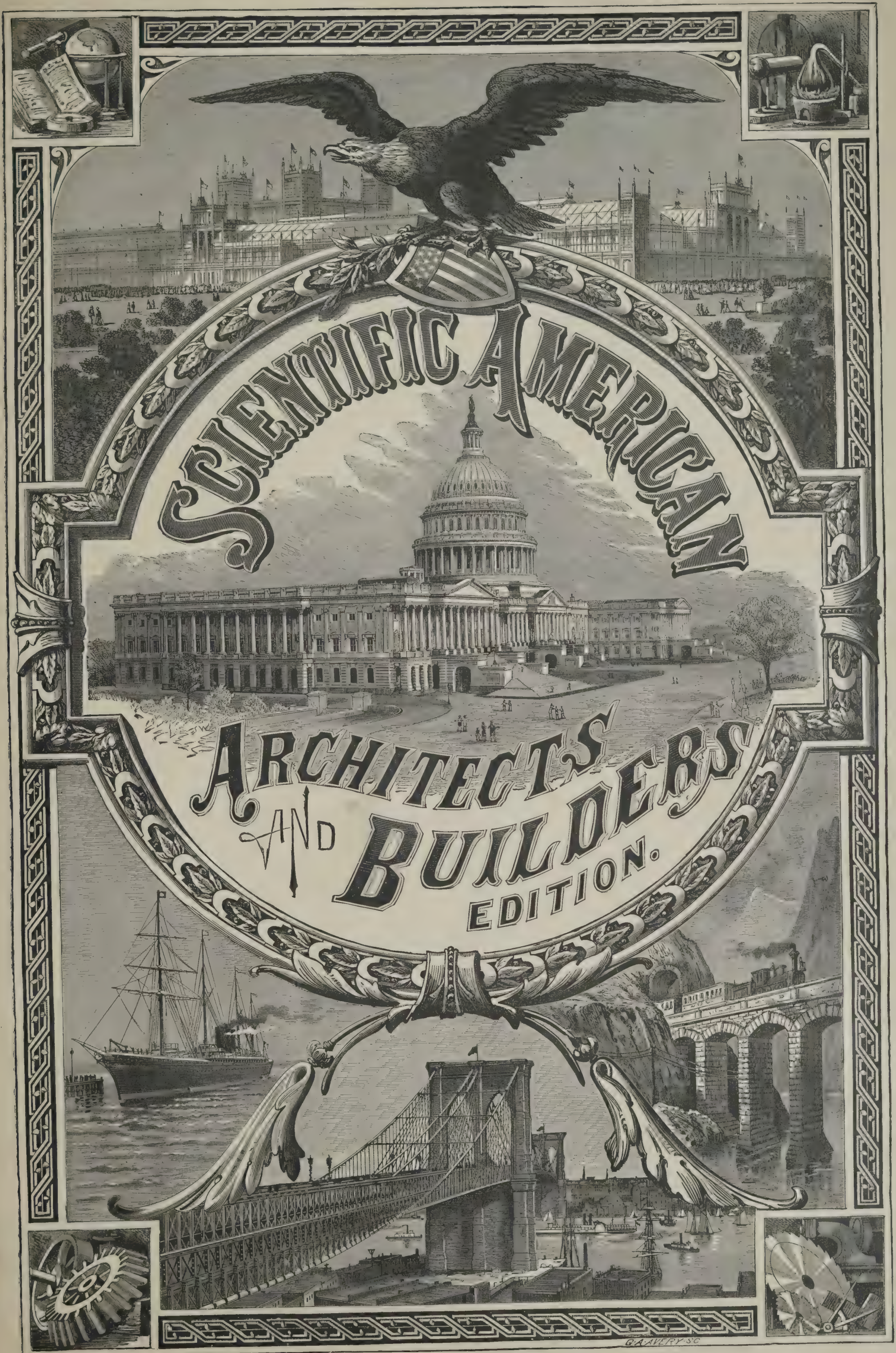
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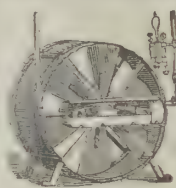
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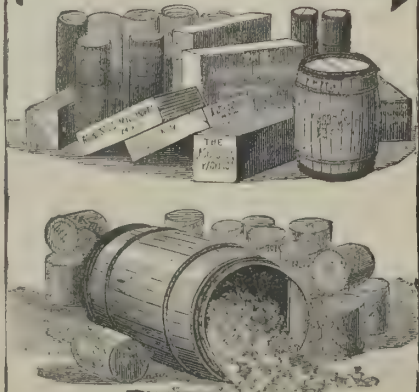
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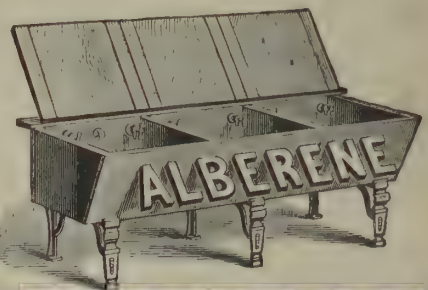
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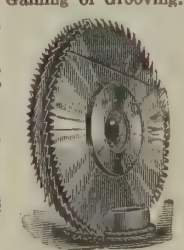
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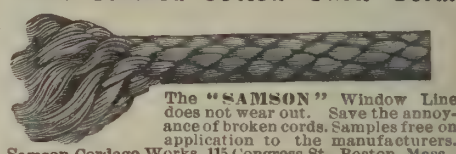
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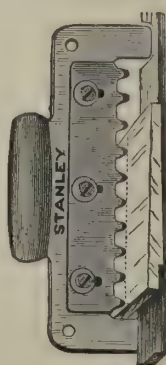


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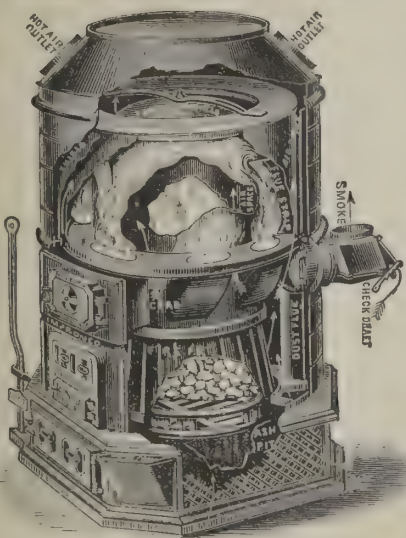
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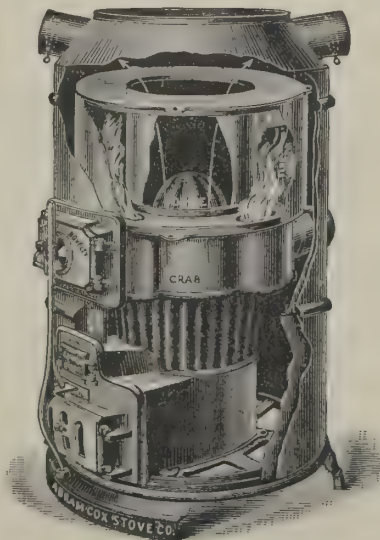
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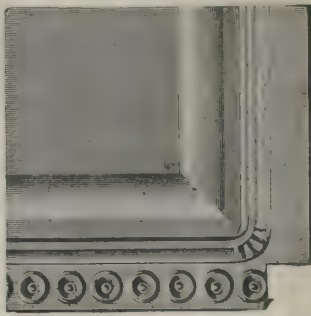
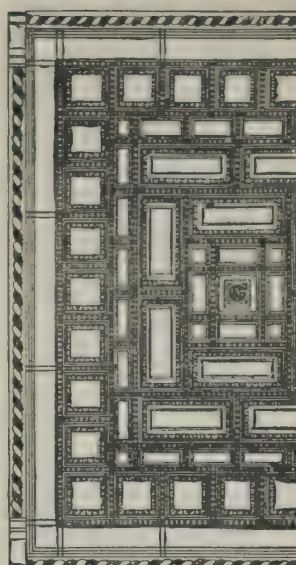
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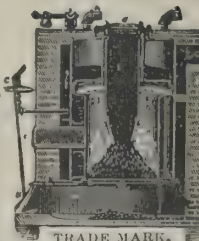
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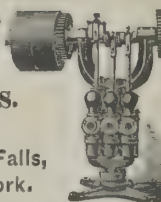


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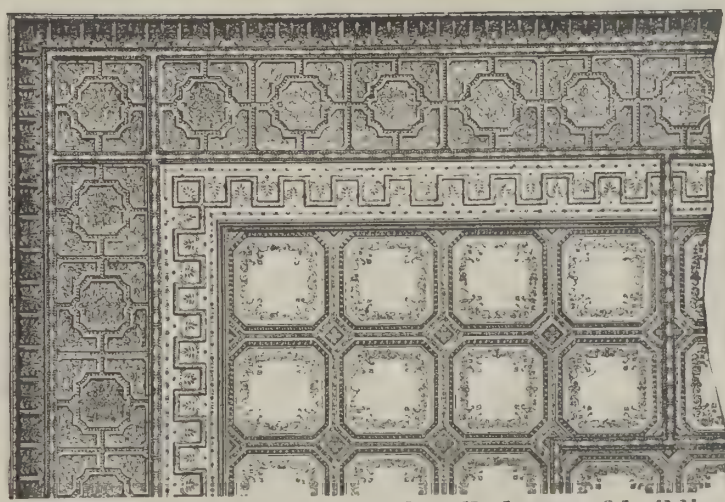
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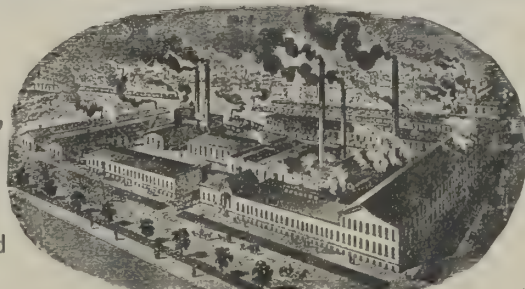
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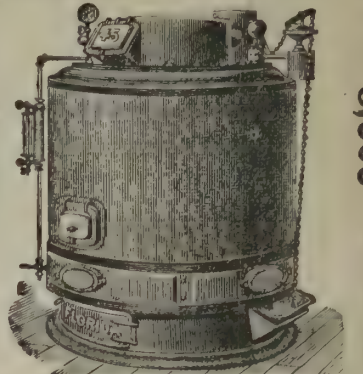
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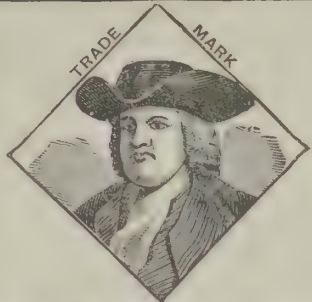
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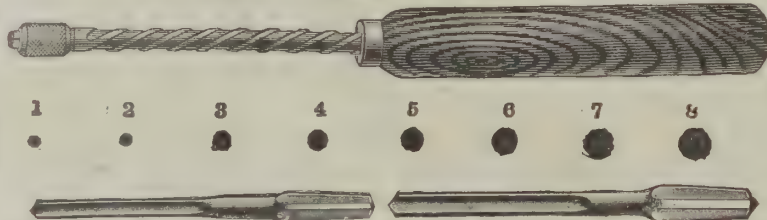
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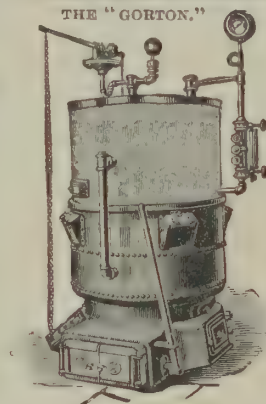
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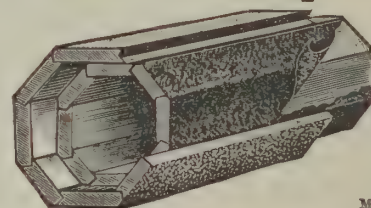


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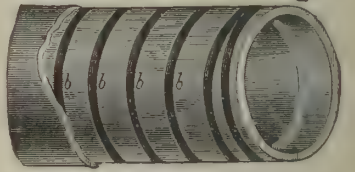
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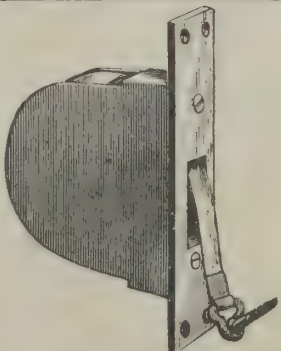
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6 x 2	3/4 to 1 1/4	3 1/2 in.	63	\$0.70	83	\$1.40
7 x 2	1 to 1 1/4	4 in.	64	0.90	84	1.75
7 x 2 1/2	1 to 1 1/4	5 in.	65	1.10	85	2.20
7 x 3	1 to 1 1/4	6 in.	66	1.40	86	2.80
8 x 3	1 1/4 to 2 1/4	7 in.	67	1.75	87	3.50
8 x 3 1/2	1 1/4 to 2 1/4	8 in.	68	2.50	88	5.00
9 x 8	1 1/4 to 2 1/4	10 in.	69	3.50	89	7.00

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